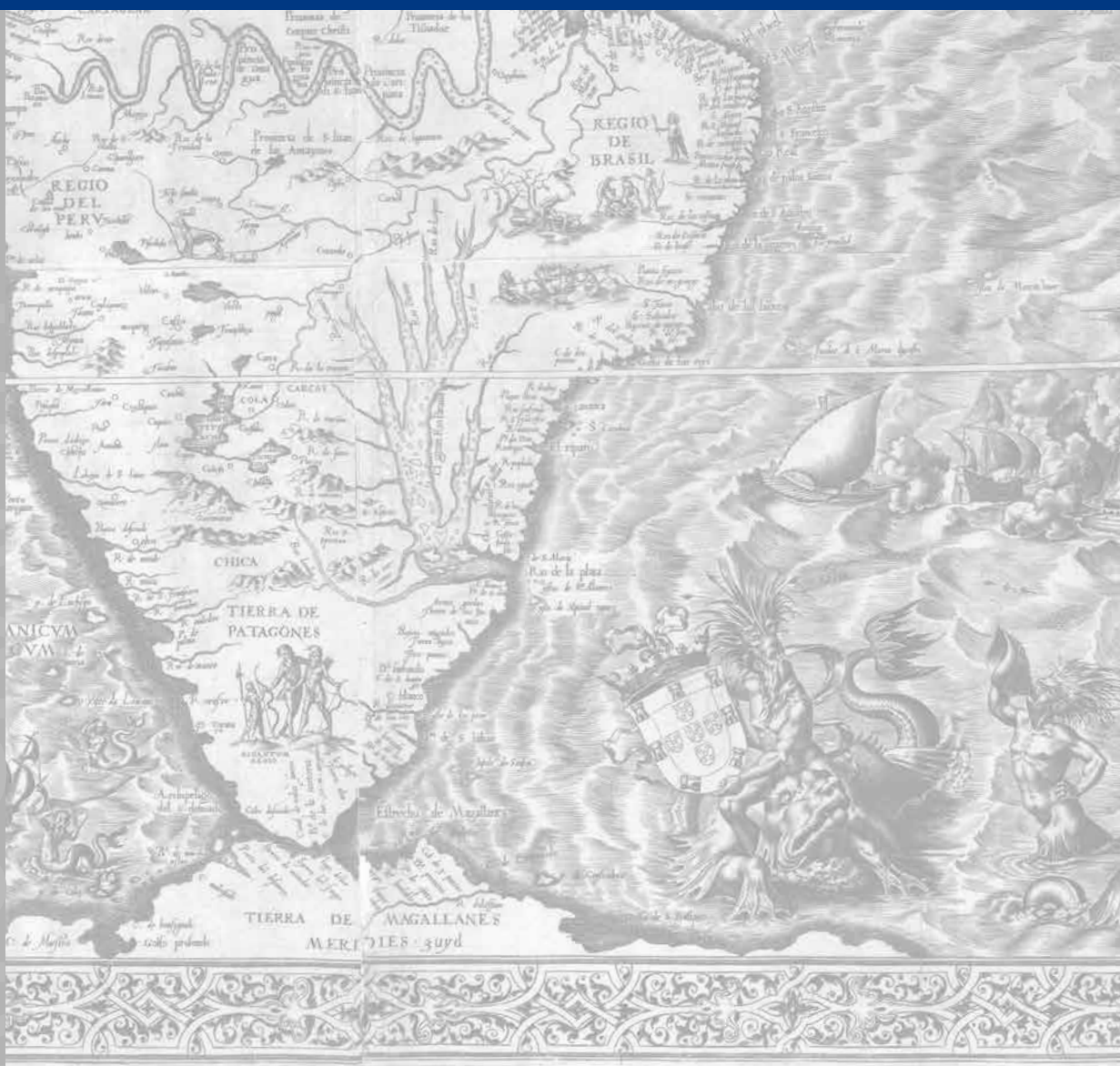




Symposium on Atlases, Toponymy and the History of Cartography

Proceedings of the ICC 2015 Pre-Conference
Rio de Janeiro, Brazil, 19–21 August 2015



Editors

Ana Cristina da Rocha Bérenger Resende
János Jeney



ICC 2015

27th International Cartographic Conference

Symposium on Atlases, Toponymy and the History of Cartography

Proceedings of the ICC 2015 Pre-Conference
Rio de Janeiro, Brazil, 19 – 21 August 2015

Cover – Background map

The Americas "Americae sive quartae orbis partis nova et exactissima descriptio",
Diego Gutiérrez, 1562

Edition Note

The follow-up Joint Commission Symposium on Historical Maps, Atlases and Toponymy took place from Wednesday 19th to Friday 21st August 2015, at the Business Intelligence Center of the IBGE – Brazilian Institute of Geography and Statistics, in Rio de Janeiro, with the support of the Directorate of Geosciences, Coordination of Cartography of this institution.

As a pre-conference to the 27th International Cartographic Conference in Rio de Janeiro, Brazil, the symposium was organized by the following commissions and working groups:

- ICA Commission on the History of Cartography
- ICA Commission on Atlases
- Joint ICA Working Group and IGU Commission on Toponymy

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Foreword

In August 2015, the International Cartographic Association organized the 27th International Cartographic Conference titled Maps Connecting the World, held in Rio de Janeiro. Before the conference, the Commissions on Atlases, Toponymy and History of Cartography met in a joint pre-conference symposium in Rio de Janeiro. This was the second time these three commissions held a joint workshop. In 2013, the same three commissions held a joint workshop in Leipzig before the 26th International Cartographic Conference in Dresden. This book contains the lectures presented by the scientists at the pre-conference workshop in Rio de Janeiro in August 2015. It is evident that most presentations were focused especially on Brazil, but some lectures focused on Europe. The topics of the lectures ranged from presenting historic maps atlases, to approaches on toponymy, ethnographic geography and a combination of two or more of these topics. The papers besides being scientific also present cultural heritage regarding Brazil and other parts of the world.

Among the non-Brazilians, Peter Jordan, from The Austrian Academy of Sciences, Institute of Urban and Regional Research presents the process of creating an atlas of Eastern and Southeastern Europe at a time when this area went through political change. He shared important knowledge that he gained in making this atlas.

Two papers on Brazilian atlases were presented by the Brazilian Institute of Geography and Statistics: one of them, prepared by Marcelo Araújo, presented the "National Brazilian Atlas", which examines critical issues facing the country today in 10 key areas and the other, by Míriam Barbuda et alii, presented "The Atlas of 1940", which enabled the consolidation of the Brazilian territorial division.

Atlases of two other countries were also presented: "The Electoral Atlas of Romania", by Corneliu Iatu et alii and the new "Graphical-statistical Atlas of Switzerland", presented by Thomas Schulz from the Swiss Federal Statistical Office. The first offers a comprehensive view of the electoral process in Romania and the latter is a new edition of one of the first and most comprehensive thematic national atlases of Switzerland on the 100th anniversary of its first publication. It offers the original panels, in addition to maps and diagrams with current figures. The paper describes the atlas itself and the decisions taken in its organization.

In another paper Thomas Schulz defends a new definition for the term "Statistical Atlases", which could facilitate and disseminate the use of statistical atlases in scientific studies as well as by the general public.

Ethnocartography was the concern of three researchers, who, nevertheless, dealt with the subject from different perspectives. Brazilian researcher Rodrigo dos Santos presented the indigenous ethnic groups in Brazil and Hungarian researcher János Jeney adopted a historical perspective. While Mr. dos Santos presented the multi ethnic structure of the Brazilian Central Highlands, Mr. Jeney presented the depiction of ethnic groups in Central Europe with focus on the areas inhabited by ethnic Hungarians.

On the other hand, the Brazilian Regina Almeida, from the University of São Paulo, shows the outcomes of projects in which map production by indigenous groups of the Amazon River plays a significant role in the preservation of cultural heritage and in the protection and management of their territory, resulting in the empowerment of these groups.

Two papers by researchers from the Brazilian Institute of Geography and Statistics (Ana Resende et alii and Beatriz Souza) deal with cultural heritage and ways of collecting and performing spatial analyses of geographical names, in order to know and understand their origins, history and motivations.

Maria Gabriela Bernardino, from Fundação Oswaldo Cruz, analyzes the cartographic activities of the Brazilian Institute of Geography and Statistics in the mid-20th century, shedding light on the international and inter-institutional cooperation carried out by the civil cartography officially undertaken in Brazil at that time.

Drawing from his surprising discovery of the original boundary lines in northwestern capitancies and of a particular configuration of the southern ones, Jorge Cintra, from the University of São Paulo, proposes a new configuration of the traditional map of hereditary capitancies of Brazil which has so far been widely reproduced in many publications and is so much familiar to Brazilians in general.

Finally, contributing to all three fields of research dealt with in the Symposium, Maria Dulce de Faria, from the Fundação Biblioteca Nacional (Brazil's national library), presents the rich historical cartographic collection of this institution.

Ana Cristina Resende, János Jeney
July 2016

Reflections of the editor on a long-term atlas project recently completed. The Atlas of Eastern and Southeastern Europe

Peter Jordan

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Abstract. The project of a thematic map series called "*Atlas of Eastern and Southeastern Europe*" (AOS) was initiated in 1987 by the Austrian Ministry for Science and Research, was published in 1989 with its first installments and was completed in 2014 with the 30th installment. It started at the Austrian Institute of East and Southeast European Studies as successor project of the Atlas of the Danubian Countries edited by Josef BREU and moved after the closure of this institution in 2007 to the Institute of Urban and Regional Research at the Austrian Academy of Sciences, where it continued its tradition of atlas work (Atlas of the Republic of Austria, Atlas of Lower Austria).

AOS was conceived as a project of basic research with a thematic focus on the spatial impact of transformation processes in Eastern Europe. This thematic focus and thus the current, diachronic presentation of essential space-related topical data and research results were it also that mainly distinguished AOS from regional atlases, including its predecessor, the Atlas of the Danubian Countries.

The paper explains and describes concept, organization and performance of the project and reflects some experiences of its editor-in-chief, such as the learning from the Atlas of the Danubian Countries, the importance of regional expertise for editing a scientific atlas, the fact that atlas editing is not a purely cartographic activity, that a thematic atlas forms a good basis for further space-related research and that a scientific atlas has a rather confined audience.

Keywords. Atlases, Editing, Thematic mapping

1. Concept, organization and course of the atlas project

The project of a thematic map series called "*Atlas of Eastern and South-eastern Europe*" (AOS) was launched in 1987 on behalf of the Austrian Ministry of Science and Research, was published in 1989 with its first installments and was completed in 2014 by the 30th installment (see list of installments annexed). It was elaborated at the Austrian Institute of East and Southeast European Studies (AIESES) as successor project of the Atlas of the Danubian Countries directed by Josef BREU and moved after the closure of this institute in 2007 to the Institute for Urban and Regional Research at the Austrian Academy of Sciences, where it continued this institute's tradition of atlas work (Atlas of the Republic of Austria, Atlas of Lower Austria).

AOS was conceived as a project of basic research with a thematic focus on the spatial impact of the transformation process in Eastern Europe. This thematic focus and thus the up-to-date, diachronic presentation of essential geospatial data and current research findings were also its main distinctions from the type of macro-regional atlases, including its predecessor, the Atlas of the Danubian Countries.

This new concept of a cartographic documentation of current and politically quite relevant topics could be taken into consideration because, unlike during the longest time of the appearance of the Atlas of the Danubian Countries (1970-1989), in some parts of the then still Communist Europe – so especially in Hungary and Poland – already liberalizing tendencies could be noticed. So it was already easier to get authors for such topics from these countries, and data sources were already better accessible. With the political turns of the years 1989-91, the situation changed anyway completely.

The added value of AOS in comparison with other national and international thematic map works results from the following characteristics and publication goals:

- *Transnational representation.* Unlike national map works AOS presents thematic issues transnationally and thus internationally comparable. This saves the reader from looking into many different statistical and cartographic sources and correlates the different classifications and concepts with each other.
- *Detailed spatial resolution.* Compared especially with world and school atlases as well as with the Europe Atlas of the European Spatial Planning Observation Network (ESPON), AOS uses relatively large scales (main maps in scale 1: 3 million and larger) and thus offers a higher spatial resolution (at least up to the level NUTS 4) and more detail.

- *Scientific character* is again achieved by detailed spatial resolution, whereby data are not presented at the average of a larger region, but spatially rather differentiated. Also the effort to transform research results into synthetic, classifying maps and thus to offer more than a cartographic transformation of statistics can be regarded as augmenting its scientific character. An additional ingredient is the comprehensive accompanying texts. With some installments they reach the comprehensiveness of a book and do not only explain the map, but integrate it into a wider thematic context.
- *Connecting Europe*. While thematic map works in larger scales published in Western Europe during the planning and start phase of AOS portrayed in a more detailed way usually only the member countries of the European Economic Community (EEC), later the European Communities (EC) and finally the European Union (EU), AOS represented also the countries east and southeast of them at the same level of detail. In this way it paved scientifically the European integration process, in which most of these countries were interested and which was also intensively supported by the Western Europe.
- *Reliable source for the rendering of geographical names*. Following the tradition of the Atlas of the Danubian Countries, AOS invested special care into a correct use of place names and respected in this context the recommendations of the United Nations. AOS could thus be regarded as a reliable source for place names in Eastern Europe.
- *Bilingualism (English/German)* in titles, map legends and accompanying texts. This was to make the Atlas competitive on the international market and easy to be used in all countries represented in it.

AOS was organized as a long-term project of a single institution and not – as usual today – as a joint project of an international consortium. In fact, this single institution functioned, however, as the interface of an international network of researchers and research institutes contributing to the Atlas with and without financial compensation. So AOS may indeed be regarded as an international co-operation project.

AOS was substantially funded by the Austrian federal ministries contemporarily responsible for science. Some installments, however, resulted also from competitive research projects financed by the Austrian Science Fund, or from co-operation with other institutes – in particular with the Leibniz Institute for Regional Geography (Leibniz-Institut für Länderkunde, IfL) in Leipzig and the Institute for Danube Swabian History and Regional Studies (Institut für donauschwäbische Geschichte und Landeskunde, IfdGL) in Tübingen.

Editorial work was executed by a small team consisting of two to four people, of whom, however, at least two were also entrusted with other tasks. In addition, to the editor-in-chief Florian PARTL was the only one to work with the Atlas as long as it was published. For a longer period also Elisabeth TOMASI, Karl SCHAPPELWEIN and Thede KAHL were engaged. The editorial board defined the topics and conceived together with the predominantly external authors (123 from 19 countries) maps and texts. It collected in cooperation with them the data and provided on its own for the cartographic transformation. It supervised also EDP-processing – at first outsourced to the Institute of Cartography and Reproduction Techniques at the Vienna University of Technology under the direction of Fritz KELNHOFER and with substantial participation of Mirjanka LECHTHALER, from the mid-1990s to the company Sféra (Head: Oskar HALZL, Eva HRIVNÁKOVÁ) in Bratislava. From 2009 onward, however, it did this work itself and also supervised the printing of maps and texts. But the members of the editorial staff also engaged themselves in the elaboration of some map and text manuscripts. Delivery to subscribers and for sale in bookshops as well as advertising was carried out in commission by Gebr. Borntraeger publishers in Stuttgart.

After a planning phase that had started in 1987 and in which Fritz KELNHOFER (Institute of Cartography and Reproduction Techniques at the Vienna University of Technology) had a substantial part, in 1989 the first two installments could be published and presented at the 13th International Cartographic Conference (ICC) in Budapest. It was by chance that the Atlas appeared simultaneously with the fall of the Iron Curtain, but this certainly attracted additional interest. A case in point is a map of environmental problems in the entire Eastern Europe (*Figure 1*) that resulted from a cooperation with a research group of the Council for Mutual Economic Assistance (CMEA). It was portraying the environmental situation of this entire region at the end of the Communist period in a comparative way. When it was published in 1992, it attracted utmost public attention.

Besides environmental topics, issues on ethnic and national consciousness were also received with particular interest. They corresponded to a renaissance of ethnic and national consciousness all over Eastern Europe after a period of rather a-national and internationalist Communism (*Figure 2*).

Around the year 2000, in collaboration with the Department of Geography and Regional Research at the University of Vienna and in personal cooperation with Karel KRIZ, Andreas RIEDL and graduates of the Institute (Christian FÜRPAŠZ, Christian RESCH, Robert SAUL), the prototype of an interactive electronic version of AOS was developed and equipped with some map themes (which had also been published in print). But due to a lack of financial resources, this functionally very powerful electronic version could not be equipped with further topics and thus enriched in content.

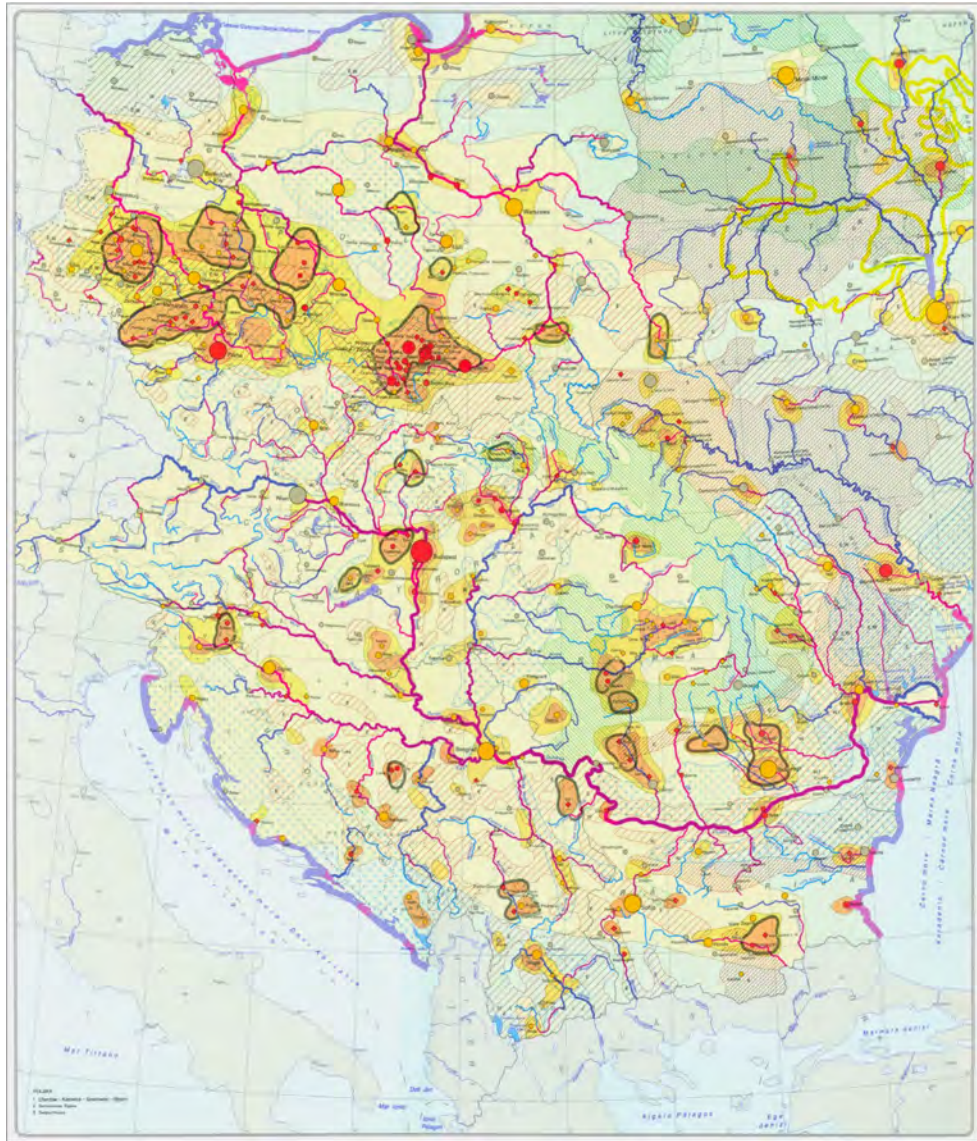


Figure 1. AOS Map No. 1.2–G4 „Environmental Problems“. Areas of complex environmental devastation appear in dark areal colors and surrounded by bands.

The in the 2000s weakening state support for a research institute with a regional scope of activities like the Austrian Institute of East and Southeast European Studies had also the consequence that AOS installments could appear only in longer intervals. It eventually led to the closure of the Institute in 2007 and to a relocation of the Atlas project to the Institute of Urban and Regional Research at the Austrian Academy of Sciences, where it continued to exist for some more years – albeit with smaller personnel and financial resources.

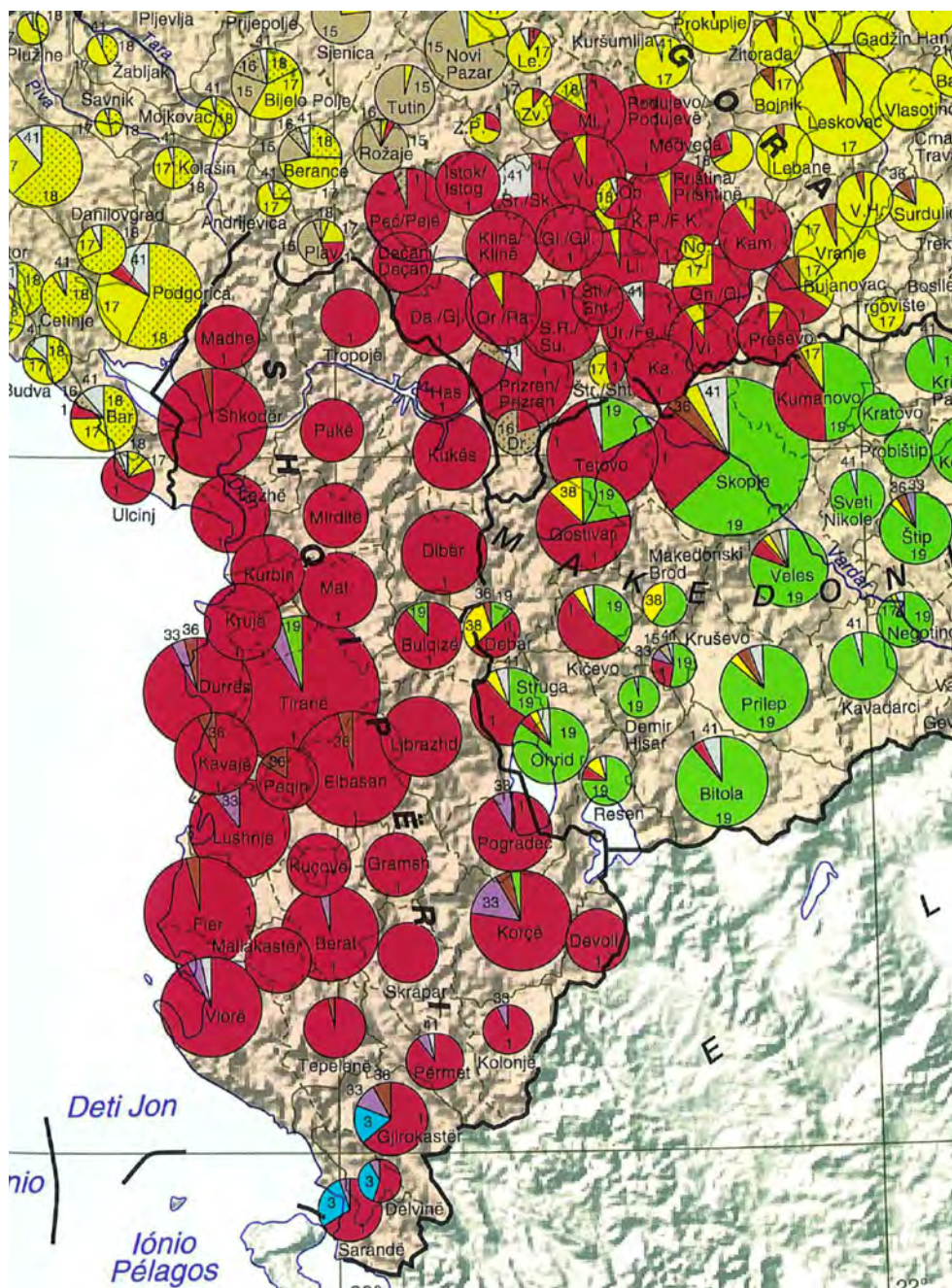


Figure 2. Summary Section of AOS Map No. 2.9–G9 „Ethnic Consciousness in Central and Southeast Europe around 2000“ with focus on Albania and neighboring regions populated by Albanians. Circular diagrams stand for administrative regions and correspond in size to their population numbers. They are subdivided into sectors indicating by colors the ethnic structure of the region. Albanians are indicated by a reddish-brown color.

2. Experiences from work with this Atlas

2.1. Work at the Atlas of the Danubian Countries was a valuable preparation

The up to ten years' involvement of some members of the editorial staff in the AOS's predecessor project Atlas of the Danubian Countries as map authors and map editors was a good preparation for the conception, organization and execution of the new atlas. This is especially true with reference to acquaintance with the problem of international comparability of concept systems and data, accessibility of data sources, understanding of the specific cultural traits and political relationships in the region, acquaintance with its languages, requirements of cartographic design of scientific and at the same time easily understandable maps and map legends, and the principles of geographical names rendering on scientific maps for an international audience. In all these respects, AOS could build on the experiences with the Atlas of the Danubian Countries, particularly on those of its editor-in-chief Josef BREU, who knew to share them in an excellent manner.

In contrast, scientific contacts with scientists and scientific institutions in Eastern Europe, which had developed during work with the Atlas of the Danubian Countries, were only very partially usable for the new Atlas. The radical political changes in Eastern Europe had their impact: younger scientists, less prominent in Communist times and in this period certainly not entrusted with contacts to the West had come to the fore and were – at least gradually and after some time – focal points and co-operation partners. Thus during the work with AOS a new network evolved. As a result of the very different political circumstances it functioned much easier and in a much more “normal” manner. For this very reason it became much denser than that of the Atlas of the Danubian Countries.

2.2. Expertise about a region is a precondition for the publication of a scientific map work representing it

A scientific atlas project of a macro-region can seriously only be elaborated, if experts from the region contribute to it actively, bring in their intimate knowledge of local conditions and offer their easier access to data and information.

A transnational project comprising several countries requires, however, in addition also central supervision and external perspectives. Also, these have to be based on expertise in the region, language acquisition included. This in turn can only be acquired by continued scientific study of the region by individuals or – even better – by whole institutions.

It therefore makes sense to maintain scientific institutions and to grant them a basic subsidy that deal mainly or exclusively with a specific cultural

region or group of countries accumulating knowledge on them over time. Very important in this respect is multi- and interdisciplinarity, since it leads to complex perspectives. Today's trend to reduce base funding in favor of the promotion of repeatedly changing project groups counteracts these requirements.

2.3. Atlas editing is not a purely cartographic activity

Even if AOS's editorial staff had not taken over the authorship of maps, but "only" acted as map editors, purely formal-cartographic knowledge would not have been sufficient. It is mandatory for scientific atlas editing not only to transform given contents correctly according to cartographic methodology; it is also important to screen contents systematically and in a critical way and to discuss them with the respective map authors. Only then an editor is able to design a logically structured as well as easily comprehensible map legend and to transform contents adequately into map language.

For this purpose, in the case of a regional-geographic map work, primarily good geographical training is very useful. Today's increasingly decoupling of cartographic and geographical education is not conducive to this. Cartography is understood rightly as a branch of the general theory of signs (semiotics) and thus as a science of its own that deals with the formal aspects of the transformation of terminology systems into the cartographic language of symbols and therefore does not take into consideration the contents of cartographic representations. But practice of thematic map editing requires in-depth examination of the respective map theme, without that a scientifically adequate and at the same time easily understandable cartographic transformation cannot succeed. It is therefore recommended that every formal-scientifically trained cartographer strives also for geographical education.

2.4. A thematic Atlas is a good basis for further spatial research

With each map of a larger-scale scientific atlas – also with very simplistic appearing elementary-analytical maps on the basis of purely statistical sources – the author is deeply penetrating into the relevant topic and the region represented. Due to human perception constraints map information is always just the compressed, leveled and mostly highly generalized condensate of a much more extensive data collection. But this data collection can be a valuable basis for further geographical research in this area by the author.

The author of a map is also forced to cover a topic for a certain areal section systematically and completely and meets, when doing so, often research gaps and interesting research questions. They may stimulate him to further and deeper research into this topic.

But not only for the author of the map himself, also for map users working in a similar field, maps as spatial data collections for a certain area and sometimes – as it is with many AOS maps – for an entire macro-region may serve as basis and inspiration for further research.

2.5. A scientific Atlas has a limited range of users

When in its conception phase the AOS – although in the first line conceived as a scientific product and addressing mainly a scientific audience – was expected to find at least to some extent an audience in high and secondary schools or among a wider interested public, this expectation was not fulfilled. Subscribers of AOS remained confined to scientists, scientific *institutions and libraries*, however, they were from all over the world. Even the fact that right in the atlases initial phase the countries portrayed were in the focus of public interest, did not make any difference. This is due to map use not being a cultural technique as widespread as counting, writing and reading and is it necessary to design maps and cartographic works specifically for a certain user group.

Although AOS has not fulfilled all expectations, it opened yet another window into a cultural region, which is closely connected with Austria. It also corresponds to a role adequate to Vienna and Austria in this region.

3. Directory of AOS installments

- | | |
|-----------------|--|
| 1 | ECOLOGY |
| 1.1-PL1 | Air Pollution in Southern Poland
1:500 000, 1:1 000 000
Author: Kazimierz TRAFAS (Kraków) published: 1991
ISBN 3-443-28508-2 |
| 1.2-G4 | Use of Environment and Resultant Problems in Central and Eastern Europe
1:3 000 000 |
| 1.2-G4 A | <i>Use of the Environment</i> |
| 1.2-G4 B | <i>Environmental Problems</i>
Authors: Tat'jana NEFEDOVA (Moskva) et al.
published: 1992
ISBN 3-443-28509-3 |
| 1.3-M1 | Topoclimatic Types in Central Europe
1:1 500 000
Author: Evžen QUITT (Brno)
published: 1996
ISBN 3-443-28512-0 |

- 1.4-M2 Ecology of Land Use in Central Europe**
1:1 500 000
- 1.4-M2 A Landscape Units**
- 1.4-M2 B Land Use**
Authors: Andrzej RICHLING (Warszawa) et al.
published: 1996
ISBN 3-443-28517-1
- 1.5-CZ/PL1 Anthropogenic Modification to the Relief of Upper Silesia**
1:200 000
Authors: Miroslav HAVRLANT (Ostrava), Andrzej T. JANKOWSKI (Sosnowiec)
published: 1999
ISBN 3-443-28522-8
- 1.6-UA1 Soil and Water Quality in the Ukraine**
1:3 000 000
Authors: Leonid G. RUDENKO, Volodimir P. RAZOV (Kiiv) et al.
published: 2001
ISBN 3-443-28523-6
- 1.7-G7 Environmental Problems in Central Southeastern Europe around 1995**
1:3 000 000
Authors: Arno HARTUNG (Leipzig), Peter JORDAN (Wien), Tat'jana NEFEDOVA (Moskva), Joanna PLIT (Warszawa) et al.
published: 2001, 2003
ISBN 3-443-28524-4
- 2 POPULATION**
- 2.1-R1 Population Distribution in the Rural Communes of Romania**
1:1 500 000
Authors: Vasile SURD (Cluj-Napoca), Elisabeth TOMASI (Wien), Michael SAUBERER (Wien)
published: 1990
ISBN 3-443-28503-1
- 2.2-R3 Language Distribution in Transylvania**
1:400 000
Author: Károly KOC SIS (Budapest)
published: 1990
ISBN 3-443-28506-6
- 2.3-YU1 Development of Higher Education in Yugoslavia**
1:3 000 000
Author: Werner WEILGUNI (Wien/Klosterneuburg)
published: 1991
ISBN 3-443-28507-4

- 2.4-PL2 Population Development in Poland 1980-1990**
 1:1 500 000
 Author: Marek KUPISZEWSKI (Warszawa/Leeds)
 published: 1992
 ISBN 3-443-28511-2
- 2.5-O1 Ethnic Structure of Eastern Europe and Caucasia around 1990**
 1:6 000 000
 Authors: Peter JORDAN (Wien), Karl SCHAPPELWEIN (Wien), Sergej TARHOV (Moskva)
 published: 1993
 ISBN 3-443-28513-9
- 2.6-PL3 Poland as a Source of Migration and Travel**
 1:3 000 000, 1: 20 000 000
 Author: Marek KUPISZEWSKI (Warszawa/Leeds)
 published: 1993
 ISBN 3-443-28514-7
- 2.7-S1 Ethnic Structure of Southeastern Europe around 1992**
 1:1 500 000
 Authors: Peter JORDAN (Wien), Gešo GEŠEV (Sofija) et al.
 published: 1995
 ISBN 3-443-28516-3
- 2.8-H/RYU1 Development of Ethnic Structure in the Banat 1890-1992**
2.8-H/RYU1 A: 1890
2.8-H/RYU1 B: around 1930
2.8-H/RYU1 C: around 1950
2.8-H/RYU1 D: around 1990
 1:400 000
 Authors: Josef WOLF (Tübingen), Horst FÖRSTER (Tübingen)
 published: 1999, 2004
 ISBN 3-443-28519-3
- 2.9-G9 Ethnic Consciousness in Central and Southeast Europe around 2000**
 1:3 000 000
 Authors: Peter JORDAN (Wien), Károly KOCSIS (Budapest) et al.
 published: 2006, 2007
 ISBN 3-443-28516-3
- 2.10-MD1 Ethnic Consciousness in the Republic of Moldova in 2004**
 1:600 000
 Authors: Thede KAHL (Jena), Dorin LOZOVANU (Chişinău), Valeria HEUBERGER (Wien)
 published: 2009
 ISBN 3-443-28529-5

- 3 ECONOMY**
- 3.1-H1 The Expansion of Tourism from Western Countries to Hungary in the Eighties**
 1:1 250 000; 1:2 500 000
 Authors: Peter JORDAN (Wien), György MICZEK (Budapest)
 published: 1989
 ISBN 3-443-28502-3
- 3.2-G2 Power Industry of Eastern and Southeastern Europe**
 1:3 000 000
 Authors: Karl SCHAPPELWEIN (Wien), Hubert GABRISCH (Wien)
 published: 1990
 ISBN 3-443-28505-8
- 3.3-O2 First Socio-economic Effects of Transformation of Central and Eastern Europe**
 1:6 000 000
 Authors: Peter JORDAN (Wien), Tat'jana NEFEDOVA (Moskva) et al.
 published: 1994
 ISBN 3-443-28515-5
- 3.4-G6 International Tourism Attractions in Central and Southeastern Europe**
 1:3 000 000
 Authors: Peter JORDAN (Wien), Karl SCHAPPELWEIN (Wien) et al.
 published: 1999
 ISBN 3-443-28521-X
- 3.5-G8 Transformation of Agriculture in Central and Southeast Europe**
 1:6 000 000
 Authors: Elke KNAPPE (Leipzig), Marina RATČINA (Leipzig) et al.
 published: 2004
 ISBN 3-443-285215-2
- 3.6-G11 Foreign Direct Investment from Vienna in Central and Southeast Europe**
 1:6 000 000
 Authors: Robert MUSIL (Wien) et al.
 published: 2011
 ISBN 3-443-285531-9
- 4 TRAFFIC**
- 5 SPATIAL PLANNING, SPATIAL DEVELOPMENT**
- 5.1-G1 Administrative Subdivision of Eastern and Southeastern Europe**
 1:3 000 000
 Authors: Peter JORDAN (Wien), Ilona SLAWINSKI (Wien)
 published: 1989
 ISBN 3-443-28501-5

- 5.2-R2 Availability of Central Facilities in Rural Settlements of Transylvania**
1:400 000
Authors: Vasile SURD (Cluj-Napoca), Elisabeth TOMASI (Wien), Michael SAUBERER (Wien)
published: 1990
ISBN 3-443-28504-X
- 5.3-M01 Central Place Systems in Central and Eastern Europe**
1:3 000 000
Authors: Frank-Dieter GRIMM (Leipzig) et al.
published: 1997
ISBN 3-443-28518-X
- 5.4-G10 Administrative Subdivision of Central and Southeast Europe 2007**
1:3 000 000
Authors: Peter JORDAN (Wien), Florian PARTL (Wien)
published: 2010
ISBN 3-443-28527-9
- 6 OTHERS**
- 6.1-G3 The Elections of 1990 in Central, Eastern and Southeastern Europe**
1:3 000 000
Authors: Peter JORDAN (Wien), Karl SCHAPPELWEIN (Wien) et al.
published: 1991
ISBN 3-443-28510-4
- 6.2-G5 The Elections of 1994-1997 in Central and Southeastern Europe**
1:3 000 000
Authors: Peter JORDAN (Wien), Gerhard MANGOTT (Wien), Karl SCHAPPELWEIN (Wien) et al.
published: 1998
ISBN 3-443-28520-1
- 6.3-R4 Presidential Elections 2009 in Romania**
1:1 500 000
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Literature on AOS

- HOFMAYER A. (1991), Der "Atlas Ost- und Südosteuropa" – eine neue Kategorie internationaler kartographischer Information? In: Österreichische Osthefte, 33, 1, pp. 127–146.
- FÜRPASZ Ch., RIEDL A., JORDAN P., KRIZ K., PARTL F., RESCH Ch., SAUL R. (2001), Suitability of a Map Server from a Cartographic Perspective. In: YANG, K. (ed.), Proceedings of the 20th International Cartographic Conference, ICC 2001 Beijing China, August 6–10, 2001, pp. 2371–2379. Beijing, ICA.
- JORDAN P. (1989), Eine Karte über den Boom des Westtourismus nach Ungarn am Beginn des neuen Atlas Ost- und Südosteuropa. In: GW-Unterricht, 36, pp. 17–19.
- JORDAN P. (1990), Aktuelle Karten über den ländlichen Raum in Rumänien im neuen Atlas Ost- und Südosteuropa. In: Geographischer Jahresbericht aus Österreich, XLVII. (1988), pp. 7–41.
- JORDAN P. (1990), Der neue Atlas Ost- und Südosteuropa. In: Grundlagen der Weiterbildung – Zeitschrift, 1, 2, pp. 104–105.
- JORDAN P. (1990), Der neue Atlas Ost- und Südosteuropa. In: Österreich in Geschichte und Literatur mit Geographie, 34, 1, pp. 55–56.
- JORDAN P. (1992), A Series of Thematic Maps on Eastern and Southeastern Europe – A New Breed of Atlases of a Larger Geographic Region. In: Internationales Jahrbuch für Kartographie, 30, pp. 63–69.
- JORDAN P. (1992), Umweltnutzung und Umweltprobleme in Mittel-, Ost- und Südosteuropa. Zwei Karten im Atlas Ost- und Südosteuropa. In: Informationsveranstaltung über umweltrelevante Fragen. Umweltschutzkonferenz im Rahmen des österreich-ungarischen Regionalen Forums, pp. 57–71 with 2 coloured maps. Wien – Seibersdorf.
- JORDAN P. (1993), Editing an international map series – specifics and problems. In: MESENBURG P. (ed.), Proceedings, Vol. 1 of the 16th International Cartographic Conference Cologne/Köln 3–9 May 1993, pp. 273–282. Bielefeld.
- JORDAN P. (1993), Novijat atlas na iztočna i jugoistočna Evropa – primer za međunarodno kooperirane v naučno-izsledovatelskata dejnost. In: Problemi na geografijata, 4, pp. 61–67.
- JORDAN P. (1994), Die redaktionelle Arbeit an einer internationalen Kartenserie. Besonderheiten und Probleme. In: Kartographische Nachrichten, 44, 3, pp. 96–104.
- JORDAN P. (1994), Small-scale Environmental Mapping as a Tool of Environmental Management and Policy. In: FODOR I., WALKER G.P. (eds.), Environmental Policy and Practice in Eastern and Western Europe, pp. 287–294. Pécs.
- JORDAN P. (1995/96), Romania in the Scope of Transformation in Central, Eastern and Southeastern Europe. Issues of a map in the Atlas of Eastern and Southeastern Europe. In: Revista geografică, II/III, pp. 105–108.
- JORDAN P. (1996), Anthropogene Veränderungen im Lebensraum der mittel-, südost- und osteuropäischen Länder und ihre kartographische Darstellung. In: Acta Facultatis Rerum Naturalium Universitatis Ostraviensis, 157, 4, pp. 145–162.
- JORDAN P. (1996), A Map of International Tourist Attractions in Central and Southeastern Europe with Reference to Croatia. In: Tourism and Hospitality Management, 2, 1, pp. 33–39.

- JORDAN P. (1997), A Map of International Tourist Attractions in Central and Southeastern Europe – Concepts and Methods. In: DEPARTMENT OF REGIONAL AND TOURISM GEOGRAPHY WROCLAW UNIVERSITY (ed.), Conditions of the Foreign Tourism Development in Central and Eastern Europe, Vol. 4, pp. 73–80. Wrocław.
- JORDAN P. (1997), Toponymische Redaktion von Kartenwerken am Beispiel des Atlases Ost- und Südosteuropa. In: KRETSCHMER I., DESOYE H., KRIZ K. (eds.), Kartographie und Namenstandardisierung. Symposium über geographische Namen (= Wiener Schriften zur Geographie und Kartographie, 10), pp. 79–85 with a map. Wien, Institut für Geographie der Universität Wien, Ordinariat für Geographie und Kartographie.
- JORDAN P. (1998), The "Atlas of Eastern and Southeastern Europe" as a New Device of Cartographic Information on Eastern Europe. In: Papers, "100 Anniversary of Geography at Sofia University, International Scientific Conference, Sofia, 14–16 May 1998, pp. 334–342.
- JORDAN P. (1999), Die touristische Attraktivität des östlichen Europa. Methodik und Inhalte einer Karte im Atlas Ost- und Südosteuropa. In: Europa regional, 7, 1, pp. 2–12.
- JORDAN P. (2007), Aussagemöglichkeiten des Atlas Ost- und Südosteuropa im Bereich des Pannonischen Beckens. In: HURNI L., KLINGHAMMER I., ROUBITSCHKE W. (eds.), Thematische Kartierungen in den Geowissenschaften / Thematic Mapping in Geosciences. Leopoldina-Meeting vom 25. bis 27. Mai 2006 in Budapest (= Nova Acta Leopoldina, Neue Folge, 94, 349, pp. 91–111. Halle (Saale), Deutsche Akademie der Naturforscher.
- JORDAN P. (2009), Mapping space-related transformation processes in Eastern Europe. Examples from the Atlas of Eastern and Southeastern Europe. In: ICA Symposium on Cartography for Central and Eastern Europe, Vienna, 16–17 February 2009, Proceedings (CD-ROM), pp. 183–200.
- JORDAN P. (2010), Mapping Space-Related Transformation Processes in Eastern Europe. Examples from the Atlas of Eastern and Southeastern Europe. In: GARTNER G., ORTAG F. (eds.), Cartography in Central and Eastern Europe. Selected Papers of the 1st ICA Symposium on Cartography for Central and Eastern Europe, pp. 323–343. Berlin – Heidelberg, Springer.
- JORDAN P., KELNHOFER F. (1996), Der Atlas Ost- und Südosteuropa. Konzeption, Gestaltung, technische Herstellung. In: KRETSCHMER I., KRIZ K. (eds.), Kartographie in Österreich '96 (= Wiener Schriften zur Geographie und Kartographie, 9), pp. 60–79. Wien, Institut für Geographie der Universität Wien, Ordinariat für Geographie und Kartographie.
- JORDAN P., RESCH Ch., FÜRPAZ Ch., KRIZ K., PARTL F., SAUL R., RIEDL A. (2001), Umweltbezüge in einem webbasierten länderübergreifenden Atlas. In: BUZIN R., WINTGES Th. (eds.), Kartographie 2001 – multidisziplinär und multimedial. Beiträge zum 50. Deutschen Kartographentag, pp. 152–163. Heidelberg, Wichmann.
- KRETSCHMER I. (1995), Peter JORDAN / Fritz KELNHOFER: Atlas Ost- und Südosteuropa, 1989 ff. In: KRETSCHMER I., Atlantes Austriaci. Österreichische Atlanten, 2. Band: 1919–1994, pp. 358–359. Wien – Köln – Weimar, Böhlau.
- RESCH Ch., FÜRPAZ Ch., JORDAN P., KRIZ K., PARTL F., SAUL R., RIEDL A. (2001), Characteristics in Data Management within a Scientific Multinational Internet Atlas. In: YANG, K. (ed.), Proceedings of the 20th International Cartographic Conference, ICC 2001 Beijing China, August 6–10, 2001, S. 884–893. Beijing, ICA.
- SAUL R., KRIZ K., FÜRPAZ Ch., PARTL F., JORDAN P., RESCH Ch., RIEDL A. (2001), Interface Design Aspects of an Interactive Atlas. In: YANG, K. (ed.), Proceedings of the 20th International Cartographic Conference, ICC 2001 Beijing China, August 6–10, 2001, pp. 1790–1796. Beijing, ICA.

National Brazilian Atlas

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Abstract. *National Brazilian Atlas – concepts and methodology:* The National Brazilian Atlas isn't a mere listing of maps. Its goal is to represent the multiple dimensions of the Brazilian territory through maps, graphics and written material. The maps and data in the National Atlas of Brazil can answer several questions related to Brazil, its relation to the world and its regional differences and inequalities. The Atlas' main objective is to avoid excessively extensive inventories which might not be aligned with the determined objectives. The National Atlas of Brazil has texts aimed at deepening the knowledge of the mapped topics. The texts grant an increased longevity to the publication, allowing each of the mapped topics to be properly interpreted according to history. Each topic is preceded by an introduction written by authors who have comprehensive knowledge of the subject. The National Atlas of Brazil allows for an integrated analytical approach to the multiple structuring forces of the contemporary national space.

National Brazilian Atlas – highlights of the Web Edition: The themes of the National Brazilian Atlas examine critical issues facing the country today in 10 key areas, including urbanization, human rights, biodiversity, energy, as well as topics such as: 1. Brazil and global geopolitics; 2. Political configuration of the national territory; 3. Environmental issues; 4. Political dynamics; 5. Changes in the economical space; 6. Transformation of the rural space; 7. Urban issues; 8. Health; 9. Education; 10. Geographical networks – flows in space.

The atlas information is available in the following formats: MS or WFS web service, according to OGC standards; Maps and database metadata; Shapefile; KML; CSV Table; PDF edited map and PNG images.

Future perspective of the National Brazilian Atlas in IBGE:

- △ To continue with the policy of releasing all spatial data as a spatial data service attached to INDE.

- ✧ Creation of a complete website with all IBGE atlases using a web spatial data service according to the SDI standards.
- ✧ Integration of the IBGE Automatic Retrieval System (SIDRA) to the production of spatial data service according to the SDI standards.
- ✧ Improve the integration between statistical metadata and geographical metadata.

Keywords. National Atlas, Geography, Brazil

1. Native People as Unique Cartographers

With the mission of portray Brazil by providing the information required to understand the reality of the country and to exercise the rights of the citizens, IBGE brings together geography and statistics in a privileged way, and thus produces articulated information about the national territory "essential to the process of knowledge renovated and decision-making in a country of continental dimensions with huge diversity in economic, social, cultural and environmental terms that marked its territory "(National Atlas 2009 4th edition).

The goal of IBGE is to disseminate this information and make it accessible to the wider public. To achieve this we follow technological developments and make use of various platforms. It is in this direction that there is a commitment to publicizing a digital version of the *National Brazilian Atlas Milton Santos*.

2. Atlas Section

The Brazilian Institute of Geography and Statistic (IBGE) is a public institution of the Brazilian federal administration. Created in 1934, it is bound to the Ministry of Planning, Budget and Management. It is responsible for a variety of official statistics in a variety of fields, as well as for cartographic references. The institute's geographical analysis include the geological, geomorphological and soil maps, as well as maps showing land usage, vegetation, regional division, geographic networks and urban studies and various thematic maps and Atlases and the referring databases. Within IBGE, the task of gathering the information produced by IBGE is the responsibility of the Atlas Section that is part of DGC (Directorate of Geosciences). This section also has the task of creating new, organized and comprehensive sets of information, maps, images, graphics and / or texts that make up the Atlas produced by the institution.

The transformation that is constantly occurring in Brazilian territorial configuration makes it necessary for constant updates of the works, which reveals the thematic diversity, the from various angles and issues involving spatial dynamics of contemporary Brazil and proper insertion and representation of Brazil in the world.

Thanks to its privileged position that ensures the Atlas Division rapid access to wide range of information produced by the different boards of Directors from IBGE, distinct products have been developed. We list the main ones below:

2.1. Sanitation Atlas

The deep regional inequalities in the substructure of sanitation make the improvement of services of water supply, sewage disposal, garbage collection and urban drainage, a goal to be achieved today, by the state and Brazilian society.

This Atlas gathers information from the National Survey of Basic Sanitation and Demographic Census, both from IBGE, and sources of other organizations and entities, and offers a wide approach to the matter, focusing not only on the spatial distribution, quality and efficiency of networks and services offered in the country, but also the relational nature of basic sanitation and the preservation of environment and quality of life of population.

2.2. Atlas of the Census

With this atlas, IBGE presents different sides of national territory configuration and the multiplicity that characterizes the dynamics and the evolution of the population, expanding, the analytical possibilities concerning demographic contrasts and social and regional inequalities already approached in previously released results of the most recent Population Census. Accompanying the Population Census conducted every ten years, a new edition of this Atlas appears in every decade. Aiming at better evidencing these matters, the publication is structured as a list of topics which covers, in a comprehensive and interconnected manner, the different aspects which form the population's demographic profile, with emphasis on regional and local differences.

2.3. Atlas of Literary Representations of Brazilian Regions

In 2006, with the release of the volume Southern Brazil, IBGE started the collection Atlas of Literary Representations of Brazilian Regions, which using maps at different scales as well as photographs and satellite images, aims to identify and represent Brazilian regions that were remarkable plot elements in some great national literature works. In this mapping, identity is the core element for the individualization of different territory segments that form the national picture.

In this project, the territorial divisions are oriented by neither political administrative divisions nor Brazilian geographical regionalization, but by characteristics and extensions based on the economic, demographic, cultural and environmental dynamics that created them. Next it focuses the cultural dimension of these territorial units derived from the perception of the region according to literature.

2.4. Brazilian Countryside Atlas

This atlas presents geographical interpretation of agricultural information produced by IBGE, through Census of Agriculture conducted every decade. In this work, the objective is to overcome old paradigms that guided the traditional interpretations of the activities of the field, opening up to a multidimensional perception of the countryside.

The maps, aerial images, graphics, photos and texts included in this study show a new vision for the delineation and characterization of the countryside, not recital anymore like the place of performance of primary activities, in opposition to the city, but as a land plot involving the rural and the urban, especially cross-sectoral integration of the economy, besides the emergence of awareness of the environmental variable as a key element.

2.5. Geographic School Atlas

Facing the student of elementary school II and High School, this product proves to be of great importance to raise awareness of society, territory and dynamics of the population and other countries. The Atlas covers various aspects of our reality and of other nations, such as environmental and cultural diversity, demographic features, economic space, urbanization, networks space, regionalization, socioeconomic inequalities, population structure, natural resources, transport networks and indicators economic, environmental and social. It also contains explanatory texts about basic notions of mapping and formation of continents. Moreover, even contemplates the parameters and National Curriculum References (NCP) of MEC, to the extent that allows the student to observe, know, understand and reflect local characteristics where you live, and other landscapes and distant geographical areas.

Finally, the main product of Atlas Division is the National Atlas of Brazil, named "*National Brazilian Atlas Milton Santos*" by virtue of Law No. 11.159, of August 2, 2005, which will lean in the next section.

3. National Brazilian Atlas Milton Santos

The Geographical Atlas is the most traditional publication of the Geography Department of IBGE. Mapmaking is an activity since the first year of the existence of the institute.

The History of National Brazilian Atlas dates back to the 1930s, with the development of Brazilian Geographical Atlas in 1937, for support the 1940 Demographic Census.

Between 1950 and 1980 the following national atlases were produced:

- ✧ Brazilian Atlas (1959);
- ✧ National Brazilian Atlas (1966);
- ✧ State and Regional Atlas: Amapá (1966), Ceará and Rondônia (1973), Roraima (1981), Maranhão (1984), Santa Catarina (1985) and Northeastern Region (1985).

In the 1990s, the product enters a new phase. From this decade are elaborated:

- ✧ National Brazilian Atlas (1992);
- ✧ National Brazilian Atlas (1996, new printing);
- ✧ National Brazilian Atlas (2000, third printed edition);
- ✧ National Brazilian Atlas – Milton Santos edition (2010).

Today, the atlas is updated every five years. The next releases on paper are planned for 2018, incorporating data from the Agricultural Census and 2023, incorporating data from the Demographic Census. The atlas is first available in a printed edition followed by a digital version.

The *National Brazilian Atlas* isn't a mere listing of maps. Its goal is to represent the multiple dimensions of the Brazilian territory through maps, graphics and written material. The maps and data in the National Brazilian Atlas can answer several questions related to Brazil, its relation to the world and its regional differences and inequalities.

As there are other products made by the DGC, our flagship publication speaks to the whole Board of production. The *National Brazilian Atlas* has texts aimed at deepening the knowledge of mapped topics. The texts grant an increased longevity to the publication, allowing each of the mapped topics to be properly interpreted according to history. Each topic is preceded by an introduction written by authors who have a comprehensive view of the subject. The *National Brazilian Atlas* allows for an integrated analytical approach to the multiple structuring forces of the contemporary national space.

In this sense, besides the use of the written text, the proposed use of graphs and other statistical series presentation of resources in the search for a more comprehensive understanding of the meaning of the *National Brazilian Atlas* and as well as the understanding of mapping, now no longer restricted to the contingency of traditional thematic mapping, but also incorporating maps and images resulting from the use of remote sensing. It should be noted that in the past information about the territory constituted a basic condition for building the legitimacy of state power, now it becomes a strategic condition for the decision in an open and diverse political environment, which holds numerous actors and social forces also organized and legitimized the contemporary world.

The diversity and complexity of questions necessary to analyze the Brazilian national territory today have led to an extended number of topics covered on the National Atlas over time. There are four topics covered in the Atlas, all with developments and integrated analysis: Brazil in the World, Territory and Environment, Society and Economy and Geographic networks.

The scope of the proposed agenda poses the challenge of articulating a wide range of professionals in the Geosciences Directorate, there are highlighting areas of Geography and Natural Resources and Environmental Studies, besides those responsible for editing and final printing.

3.1. Brazil in the World

In this section, introductory, maps are presented, text and graphics that present in summary the territory and the Brazilian political divisions and discuss the inclusion of the country on the world stage. It is understood that the understanding of the place of Brazil in the world should encompass the multiple dimensions that shape the current geopolitical, perceived as constantly moving. Thus, this section provides maps on the physical space, climate, ocean currents, water resources, forests, environment, population located in the territory, territorial distribution of GDP and social indicators, communication flows and energy networks.

3.2. Territory and Environment

After an initial introductory section, the Atlas goes on to devote more long sections to detail aspects already suggested in the first part. The territory represents one of the foundations and symbol of national identity, which makes your map a central reference in the world. In this section, the Atlas displays maps about the evolution of political Brazilian division throughout history, evolution of municipal mesh and institutionalized spaces and regional divisions for the Brazilian space. As it should be, much of the section is occupied by maps that detail the physical aspects of the Brazilian territory, such as geological, geomorphological and environmental aspects, in addition to various environmental risks to which the territory is exposed.

3.3. Economy and Society

The human aspects of Brazilian geographic space are gathered in the third section of the *National Brazilian Atlas Milton Santos*. The economic and social education should be seen as a fundamental category for understanding the geographic space. So maps are presented, graphics, images and texts that discuss the demographic dynamics and the urbanization of Brazil, social inequality, aspects of health and education, access to basic sanitation and citizenship. Also economic data as GDP growth, employment, business and bank networks, public finance and tourism are published in this section. The maps, charts and graphs include the historical development of indicators and are accompanied by analytical texts whenever necessary.

3.4. Geographical Networks

Finally, the geographical networks receive a specific section, understanding as central elements to the dynamics and transformation of contemporary geographical space. The *National Brazilian Atlas Milton Santos* embraces even the networks focused at orientation as geodetic network and cartographic network, such as the networks that are distributed over geographic space as the urban network in Brazil, roads, power grids, telecommunications and information networks.

We can conclude with the fourth edition of the *National Brazilian Atlas Milton Santos*, that it could be noted that over the years 2000 the Brazil's geography has changed in the sense that deepened the internalization process, revealed by the evolution of stroke the urban network, the population density and mobility, the economic space and by enhancing the use of natural resources. At the same time, however there is a revaluation of the coastal space, with the expansion of tourism activity and the oil geography.

4. National Brazilian Atlas: Perspectives

The IBGE has to manage a wide variety of users and demands such as governmental planning and decision-making (federal, state and municipal levels), academic community, service companies, market assessment, locational decisions of enterprises, press and private citizens. Each user has specific needs. So to meet these demands, the IBGE offers its products in various formats and platforms.

In addition to the printed Atlas, a combined on-line/CD/DVD version is being implemented to provide the Brazilian National Atlas Milton Santos in digital form. The goal is to assure users an easy access to statistical and geographical data, in formats compatible with most of the popular mapping software. With the new platform, one will have the possibility to compare different scales (several territorial levels), relate information from different

sources, create custom thematic maps and access to statistical and geographical synthetic analysis.

The *National Brazilian Atlas* with the new platform will illuminate today's complex national issues like no other mapping resource. Now, in its new web version, this atlas conveys up-to-the-minute geopolitical, economic and environmental changes and brings to light the most timely and relevant topics gripping Brazilian territory and society today. Through the detailed and accurate maps, informative fact boxes, charts, and beautiful, engaging design that are its hallmark, this state-of-the-art atlas covers the vital developments of the country in the reliable, authoritative, and innovative style that will make the National Brazilian Atlas *in web version* a leader in Brazilian cartography.

This infrastructure is based on open patterns and has a strong interoperability.

The first contact of the user with the Atlas is with a edited map. This approach allows the users to see if the information is what they need and also show spatial patterns based in a research of specialized professionals. For example, if the user needs to work with a more “raw” data, he or she can “add the map for analysis” and access the information.

The interoperability is another important characteristic of this Atlas. The user can access in the following formats:

- a WMS or WFS spatial service, according to OGC standards. Most GIS software products can use this format;
- a PDF of the paper version of a particular map;
- a PNG image of a particular map;
- a KML format, to use in software like Google Earth;
- a Shape File Format; Most GIS software products can use this format;
- a table of statistical data in CSV format.

The Future perspective of the National Brazilian Atlas in IBGE is to continue with the policy of releasing all spatial data as a spatial data service attached to INDE. We also plan the creation of a complete website with all IBGE atlases using a web spatial data service, the integration of the IBGE Automatic Retrieval System (SIDRA) to the production of spatial data service and to improve the integration between statistical metadata and geographical metadata.

The first release is scheduled for early 2016, with versions in Portuguese, English and Spanish.

5. Conclusion

Publishing a *National Brazilian Atlas* by IBGE that time is of the utmost importance, firstly to rescue one of the most traditional products of the institution that was responsible, until the mid-70s, for the diffusion of geographical knowledge among different generations of students.

Therefore, it is of great relevance that this issue relies on written texts, composed for the most part by geographers, aimed at deepening the themes displayed.

The texts give longer life to work and allow the spread of Atlas not only between public and academic institutions, as among a broad audience interested in the comprehensive knowledge of the country we live in.

Constituting a valuable country's territorial reality retraction instrument, the National Atlas is of particular importance given the continental influence of Brazil and the enormous social, economic and environmental diversities that exist in it. In the *National Brazilian Atlas Milton Santos*, we can view together the different features of both the physical half of the country, such as the distribution of the population and the infrastructure that enables the mobility of this population. The atlas provides a comprehensive, interconnected vision, spatially and temporally, of the phenomena that are usually seen in a fragmented and isolated manner in different works and specific studies. The digital version of the Atlas will contribute to the dissemination of information, ensuring easy access to all users that lack access to the Internet.

References

- Instituto Brasileiro de Geografia e Estatística – IBGE (2012). Atlas Geográfico Escolar, 6ª Edição. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2006). Atlas das Representações Literárias das Regiões Brasileiras, Vol 1 Brasil Meridional. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2009). Atlas das Representações Literárias das Regiões Brasileiras, Vol 2 Sertões Brasileiros I. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2003). Atlas do Censo Demográfico 2000. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2013). Atlas do Censo Demográfico 2010. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2011). Atlas do Espaço Rural Brasileiro. IBGE, Diretoria de Geociências, Rio de Janeiro.
- _____. (2011). Atlas do Saneamento. IBGE, Diretoria de Geociências, Rio de Janeiro.

-
- _____ (2000). Atlas Nacional do Brasil Milton Santos – 3ª edição. IBGE, Diretoria de Geociências, Rio de Janeiro.
-
- _____ (2010). Atlas Nacional do Brasil Milton Santos – 4ª edição. IBGE, Diretoria de Geociências, Rio de Janeiro.
-
- _____ (2012). Meu 1º Atlas 4ª Edição. IBGE, Diretoria de Geociências, Rio de Janeiro.

Construction and Management of the National Territory – The “Atlas of 1940”

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Abstract. The Brazilian political-administrative division is one of the most dynamic of Western countries, especially regarding the changes in their borders for over five centuries of history, since the Treaty of Tordesillas in 1494. Among the anomalies found in the Brazilian territorial division, many persist today as legacy of the historical construction of the territory; others were created recently as a result from the Republican and Imperial times, motivated by disputes over the occupation of its vast territory. Inserted in this context, the Atlas of Brazil's Bordering and dividers lines also known as "Atlas of 1940", published by the National Council of Geography (CNG), in which graphic and descriptive each international and interstate division in the country were studied.

Keywords. Brazilian territory, Interstate Borders, Systematic description and mapping

1. Introduction

The formation of the Brazilian territory occurred through two different and complementary strategies: territorial conquest and diplomatic negotiations. In this context, the appearance of the Portuguese Court in 1808, three hundred years after the discovery of Brazil, represents an important changing point regarding the formation of the Brazilian territory as it took over the role to dominate, control and exploit all the existing possessions on the continent. However, the territorial unity of Brazil's vice-kingdom could not be guaranteed at that moment. The royal territory bore the marks of centuries of colonization, in the form of a complex web of forged regional interest in several parts of the vast territory, which translated into commercial and territorial conflicts against the centralizing strategy of the Court. As Brazil

became independent in 1822, the Brazilian Empire, which was in transformation of a colonial entity into a single political body, was at stake more than ever. The Emperor Dom Pedro established the new boundaries of the empire – from the Amazon River to the Plate River – and reassured the importance of unity and integrity of the territory as constituent foundation of the nation and the Brazilian identity.

In the Republican era, the Brazilian public administration had three levels of government: federal, state and municipal. It still faced an issue of extreme importance: the lack of knowledge of its territory and topographical conditions of its area of jurisdiction. The border issues still created all kinds of problems. In order to set the Brazilian development, the government needed to learn more about the country, and in this context, the knowledge regarding the territory and the population (statistical) became a national priority, enabling the creation of IBGE on May 29th, 1936. The purpose was to support the planning action of the state on the territory, and systematize information of the territorial framework in all aspects: physical, economic, legal, political and population; besides performing cartographic works in several scales, rearranging the political and administrative units, such as defining the boundaries and limits, rationalize the place names of municipalities and districts and establish a new territorial division.

Within this context, the Atlas 1940 is inserted as the result of actions implemented by the CNG / IBGE for better understanding and definition of the national territory, as well as enabling the consolidation of Brazilian territorial division, which would be practiced to support the Census operations of the Demographic Census of 1940.

2. Summary of the formation of the Brazilian territory

In order to understand the motivation for the making of the Atlas of 1940, we must learn how the formation of the Brazilian territory happened.

The current Brazilian territory was included in the period of the legal and political sovereignty of the Portuguese Crown in the lands east of the meridian of Tordesillas, making it a discontinuous section of the Portuguese territory. The direct dependence lasted until the Court was transferred to Rio de Janeiro in 1808, although it had already begun to change in 1721, when the territory was recognized as the Vice-kingdom of Brazil. The occupation of the current territory initially occurred with the establishment of Sesmarias (land granted for the Portuguese settlers) and subsequently with the implementation of the hereditary captaincies, large strips of land, ranging from the coast to the line of the Treaty of Tordesillas (*Figure 1, left*).

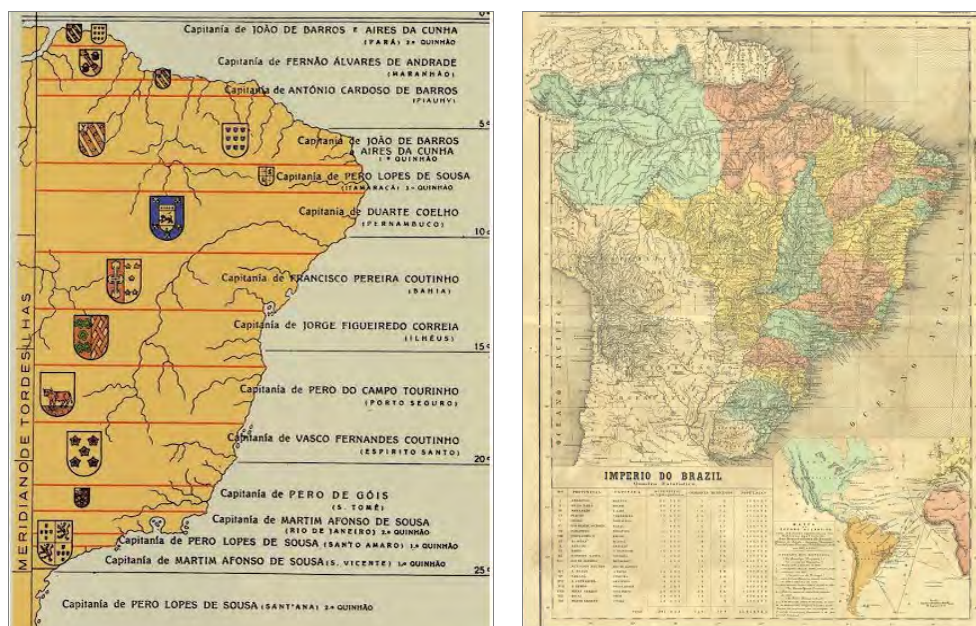


Figure 1. Brazil's captaincies (left); Map of the Brazilian Empire / Atlas do Império do Brasil – 1868 (right).

The hereditary captaincies were created from 1534 to 1536 and they represented the first political and administrative division of the Brazilian territory. Brazil was divided into fifteen captaincies with different coastal regions. However, the Brazilian Empire was responsible for defining nearly over half of the full extent of the current land borders and annexation and consolidation of new areas to the Brazilian territory. During this period, due to strategic issues, the emperor was focused on the demarcation of the Brazilian borders and not on the definition of the provinces (*Figure 1, right*) that in the future, would become states with the proclamation of the Republic. The monarchy's legacy to the new Brazilian Republic was hundreds of pending issues regarding the state borders in the country.

In the Republican period, the changes in the political and administrative division were the result of the creation of federal territories and the break up of states. In this period of history, debates about the definition of inter-state borders permeated the beginning of the Brazilian Republic, where the most critical time refers to the period called First Republic (1889-1930). The "flow of internal limits" in some parts of the country was so strong, that the Federal Government had to intervene to solve or hasten the settlement of disputes between states borders. To settle this, the Federal Government held the Conference of "Interstates Limits" from June 1st to July 14th, 1920.

The reality was that in the beginning of the 20th century, Brazil did not have a technical cartographic document that was accurately built to extinguish the questions regarding the state borders and that could also serve as base for the preparation of legal and/or technical opinions.

3. Definition of Interstate Borders

The precise definition of the division lines of the political and administrative units of the country was formed in the Republic, specifically during the period called “Estado Novo” (New State), one of the major national issues of that time in Brazilian history, because of the numerous conflicts generated by the inaccuracy of the division lines between states, which originated in colonial period and lasted throughout the Imperial period.

By definition, the border is a dividing line space that indicates what belongs to each unit and the assets included in them. Based on this principle we can point to the existence of three types of borders: geometric, astronomical and reference. The first one is a straight line between two points that crosses rivers and mountains (typical example of the North American intern division). The astronomical is related to a more accurate orientation, following the principles of cartography, using the meridians and parallels as parameters. The reference currency follows, at a certain distance, a geographical feature represented on maps, such as rivers flowing, mountain ranges or coastlines.

In Brazil the territorial clipping of the first administrative districts followed the geometric and reference models, using the coast (east) and the line of Tordesillas (west) as parameters. According to Therezinha de Castro (1966), the boundaries of these districts were outlined in a succession of bands or parallel lines, using as a starting point a coastline that did not follow in the same direction until the meridian of Tordesillas, which its exact location was unknown. However, de Castro affirms that the territorial formation of Brazil would gradually break these arbitrary molds, carving its appropriate shape. Indeed, with the development of the Portuguese colonial system, four major centers were responsible for the main territorial expansion of the Colônia: São Vicente, Salvador, Recife and Belém. Early in the eighteenth century Brazil already had an internalized territory, composed of units dissociated from the initial geometric model, which had new constituencies created from administrative, political and geostrategic interests. However, the layout of the borders of these units (which were outlined when they were created or considering the *utis possidetis* principle), was extremely poorly demarcated, as it was based on adjacent and unfamiliar geographical features. A border outline example was reported by Cândido Mendes regarding the border lines between Amazonas-Pará and Amazonas-Mato Grosso. The limit is a straight imaginary line from Monte Parintins to

a point on the left riverbank of the Tapajós River, across from the Paranatinga Mountain or Três Barras, ignoring the extreme and well-defined boundary that would form the same Tapajós as in *Figure 2*.

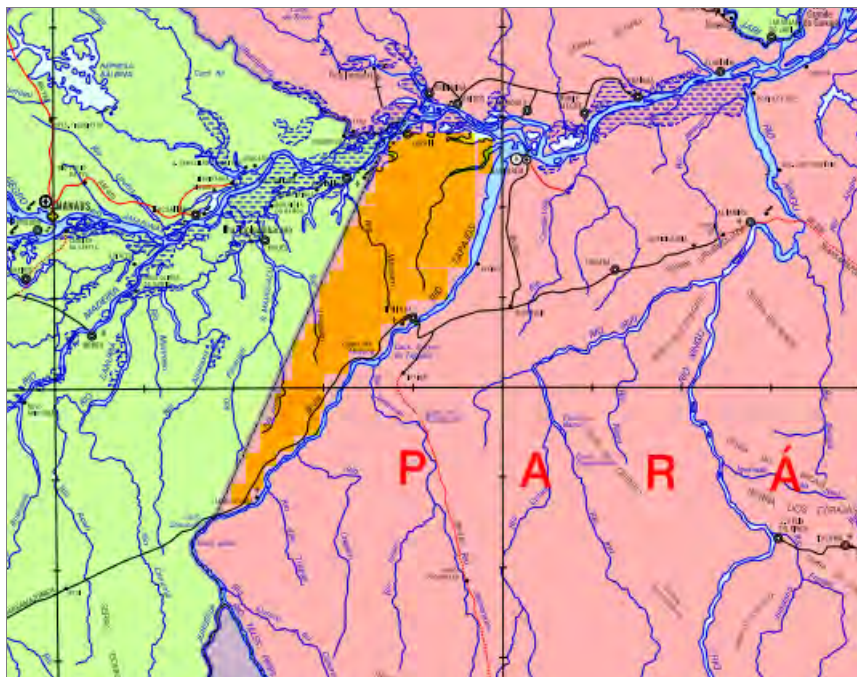


Figure 2. Brazil's State border Amazonas-Pará. The area in yellow shows the region between the straight imaginary line (current border), and the suggestion by the left riverbank of the Tocantins river (Brazil's political map, IBGE, 2004).

In that case, Pará would lose some of its territory, but this lost would not be significant because the state would benefit from having a navigable river as a border, instead of a straight line of 80 leagues, almost impossible to define the boundaries in a clear way to avoid objection. “There is nothing in the law regarding the other borders with Pará and Mato Grosso, because the enactment of 1757, responsible for creating the captaincy of Amazonas did not indicate them”.

Most of the current Brazilian states had inaccurate borders, caused mainly by the lack of detailed territorial framework that the Portuguese and Brazilian governments decided not settle by political convenience and poor structure, at the beginning of the Republic. The inaccuracies of the borders resulted in several conflicts that crossed the first Empire, creating in some cases, armed conflicts such as the famous issue of the main street “Pedras do Fogo”, on the border between Pernambuco and Paraíba. On two different occasions the unhappy locals (in 1839 and 1841) used guns to decide to which of the provinces they should belong to. Police involvement was necessary to stop them.

Another example that can be mentioned on the border issue during the Empire, is the issue of Minas Gerais, which had disputes with all neighboring provinces (Bahia, Goiás, São Paulo, Rio de Janeiro and Espírito Santo). Minas Gerais had mobile borders at its extremity where it bordered Triângulo Mineiro (Mineiro Triangle) was connected to São Paulo and Goiás, southern Minas Gerais to São Paulo, the Forest Zone in Rio de Janeiro and Espírito Santo and the north to Bahia's livestock area. However, the neighbor's objections, were postponed indefinitely, as the possessions were kept using the principle of *utis possidetis*, mainly supported in the city halls by a representation from Minas Gerais, which had a larger population.

In the Republican government, the border issues strongly rose; given the autonomy of political concessions that gave the states the authority to manage their respective territorial jurisdictions. The precise definition of the borders gained national recognition due to the imminence of a civil war risks and secessionism of the federal units. The intensification of border disputes caused violent armed conflicts in this period, like the Contested War between Paraná and Santa Catarina, which forced the Federal Government to intervene. After this incident, due to the constitutional principle of non-intervention of the state, the federal government tried to solve the issue, by creating the Interstate Limits Conference in 1920. During the Conference from the 12th to 14th of June 1920, seven direct and six indirect agreements for settlement were signed by arbitration. Among the direct agreements we emphasize the ones between Pernambuco and Paraíba; Pernambuco and Ceará; Paraíba and Rio Grande do Norte; Minas Gerais and Bahia (the agreement between the two states was rejected at the time by the deputy of Pernambuco as it included the area of the District of São Francisco, that was withdrawal from Pernambuco in 1817); Piauí and Maranhão; Minas Gerais and Rio de Janeiro; São Paulo and Rio de Janeiro.

The following agreements for solution through arbitration were signed by the deputies of the states: Minas Gerais-São Paulo; Goiás-Pará; Goiás-Mato Grosso; Piauí-Ceará; Distrito Federal-Rio de Janeiro; Pernambuco-Alagoas; Rio Grande do Sul and Santa Catarina. During the conference the issues of boundaries between Bahia and Pernambuco (due to the contested District of São Francisco); Bahia and Sergipe; and Bahia and Espírito Santo remained unresolved.

According to Lysias Rodrigues (1947), due to the unresolved issues, the remnants contributed to strengthen regionalism. Not even the Constitution of 1934, which had set a timeframe for the resolution of the past issues, or the Constitution of the 1937 solved the dispute, leaving the border conflict to the use of the secular principle of *utis possidetis*.

4. The purpose of the Atlas of 1940

IBGE, under Resolution of the General Meeting of the National Council of Geography (CNG; 06.24.1939), stated that the issue of state border was deeply linked to basic projects of the Institute, because its solution depended on the accuracy of the census data and the accuracy of the *International Chart of the World* on the millionth scale, regarding the territorial circumscriptions.



Figure 3. Map of the border between Rio de Janeiro and Espírito Santo, Atlas of 1940 (CNG, 1940).

As a solution to the problem, the organization formed by the General Secretariat of the Council, suggested the organization of the first edition of the "Atlas of the limits of the United States of Brazil," in which the graphics (*Figure 3*) and the description (*Figure 4*) would be studied for each international and interstate confrontation, conveniently pointing out those included areas between the representative lines.

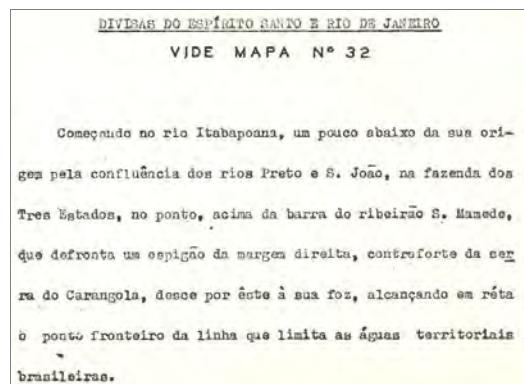


Figure 4. Descriptor of the border between Rio de Janeiro and Espírito Santo of the Atlas of 1940. (CNG, 1940).

The country's municipal division outline was regulated by Federal Decree Law nº 311, 2 March 1938, which established the first territorial division of Brazil, defining the territory of the municipalities, as seen in *Figure 5*.

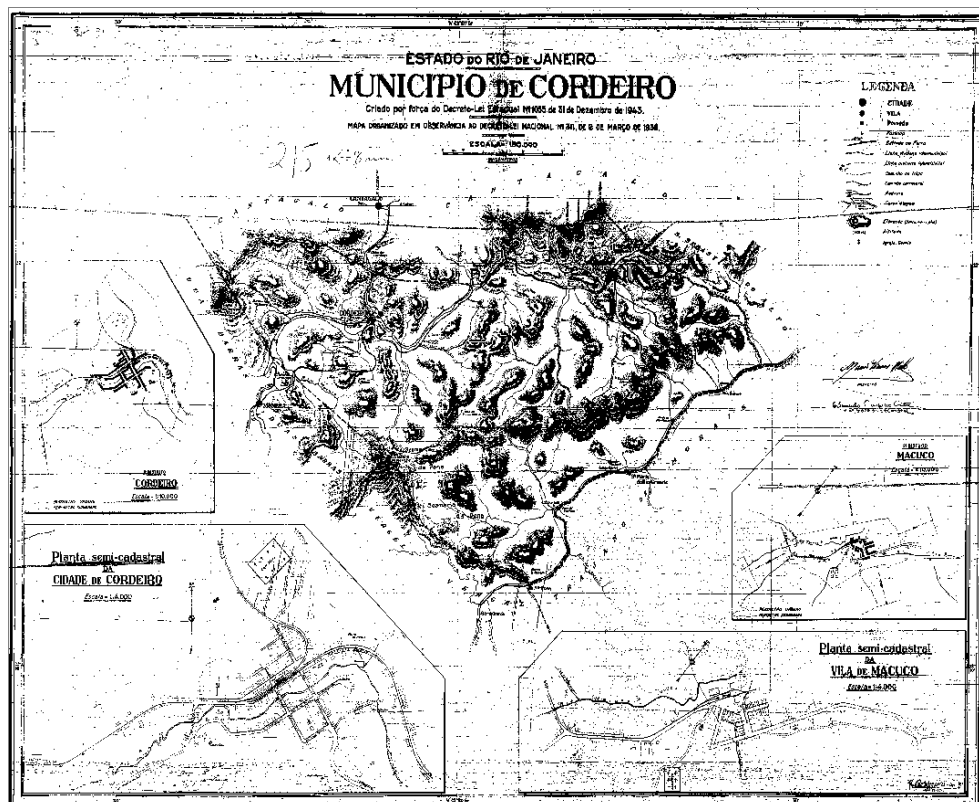


Figure 5. Municipal Map of Cordeiro (state of Rio de Janeiro) done according to the Decree Law 311.).

Based on this, large amount of cartographic updating work was done by all existing 1574 Brazilian municipal governments at the time, as well as a systematic description of the boundaries. Mapping according to general instructions issued by the National Council of Geography was also done, seeking the proper representation of inter-city and inter-district boundaries, with temporary data for the area, the number of population and the population density of Brazilian municipalities.

With the publication of the Atlas of 1940, the possibility to standardize the activities necessary for the best possible treatment of differences of state within the IBGE was created. Basic conditions were established to characterize the contentious problem and treat it systematically by the several "user limits" within the institution and the public administration in its three government levels.

So the Atlas 1940 constitutes a unique publication, containing a set of maps, along with their descriptions or descriptive memorials of all the borders of existing states at the time of its publication.

5. Conclusion

The search for solutions to ensure the efficiency of public management is a challenging path. In this context, the Atlas of 1940 is the only reference document over the past 75 years of the Brazilian state boundaries. However, although it appears in the Federal Constitution of 1988, the settlement of disputes on state and municipal boundaries, have not been effectively dealt with, in any of the political and administrative units.

In this context, knowing the historical issues, the actions and projects developed over time and proposing solutions to improve the territorial structure of Brazil, in addition to other aspects, is the responsibility of the government, academy and civil society as a whole.

References

- CASTRO, Therezinha de. Retratos do Brasil: Atlas - textos de geopolítica. Rio de Janeiro. Rio de Janeiro, BIBLIX, 1966.
- BRASIL. Decreto Lei nº 311, de 2 de março de 1938. Diretoria de Estatística de Produção. Rio de Janeiro, IBGE, 16p., 1938.
- MIYAMOTO, Shiguenolli (1981). O pensamento geopolítico brasileiro (1920-1980). Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo. Tese de mestrado.
- RODRIGUES Lysias A. (1947) A geopolítica do Brasil. Rio de Janeiro, BIBLIX, 1947, 140 p.
- TEIXEIRA DE FREITAS, M. A (1941) A Redivisão política do Brasil. Revista Brasileira de Geografia. Rio de Janeiro, IBGE, ano 111. n. 3, 533-54, jul.tset. 1941, p. 536.

Electoral Atlas of Romania: 1990–2009

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1. Introduction

Romania belongs to the wave of Eastern European countries whose transition from communist totalitarianism to democracy was fairly sudden, triggering effects on multiple levels. Thus, it passed from an election system based on one single party and one single president option to a multiparty one. The purpose of the Electoral Atlas of Romania was to radiograph the electoral phenomenon from multiple perspectives, providing a comprehensive tool to those interested in better understanding and grasp electoral logic, mechanisms and behaviors.

This study was intended as an enterprise of electoral mapping, from a basic level to other administrative divisions, so that electoral reality could cease to be fiction, while fiction might not change into electoral reality. Electoral Romania is a publication which reflects history, mentalities, inheritances, influences, frustrations, desires and dreams. The experience of almost 50 years of communism influenced people's way of thinking, introduced barriers (including ideological ones), and distorted democracy and pluralism. In the electoral field this is mirrored through the presence of extreme influences, the continuing existence of certain status quos, urban-rural cleavage, the electorate's unwillingness to move to a real participatory democracy, the lack of control that the electorate and civil society have over those elected to public office, as well as through the absence of some kind of clear political balance sheets by means of which politicians could be made to take responsibility for unfulfilled promises and failures.

The analysis of the Romanian voting system demonstrates that within a relatively short period of time there was a shift from a property-qualification-dependent and partial suffrage to a partial suffrage, then to a quasi-universal suffrage and then a false universal suffrage, and finally, after 1989, to a genuine universal suffrage. All these changes that took place during the past decades have had major repercussions on election results.

The present atlas is intended as a tool amongst others for the broader public. The presentation of the material was preferred in this way in order to make it as understandable as possible. Furthermore, we opted for a trilingual version to make it easier for foreign readers to become acquainted with Romanian electoral geography and to better understand what has happened to date with the aid of a study.

Although an atlas, by definition, implies maps, graphs, cartograms, on this occasion we have chosen to complement them with a comprehensive analysis (quantitative and qualitative). The step-by-step investigation of the results of all electoral processes since 1989 (presidential, parliamentary and local elections, referenda and European parliamentary elections), and the reasons for these results make up the main part of the atlas. We trace the development of electoral alliances and the geographical particularities of different ballots, the information being accompanied by and given visual expression in a large number of color maps (over 300 maps). Moreover, the atlas highlights the political and economic circumstances in which the various elections took place, the way in which electoral campaigns were organized, the geographical distribution of the votes and regional variations. This is done for every election. Another main component is devoted to the presentation and analysis of the political orientation of parties and alliances, together with all the changes that have taken place over time, with an emphasis on the long period of official prohibition of political parties during the years of totalitarianism.

2. Types of elections

Electoral events since 1989 have almost been covered in their entirety. Consequently, the parliamentary elections analyzed and mapped here (for the Chamber of Deputies and the Senate) are those held in 1990, 1992, 1996, 2000, 2004 and 2008. The 1990 parliamentary elections could not be mapped at the basic administrative unit level because the database was destroyed. The local elections taken into consideration are those of 1992, 1996, 2000, 2004 and 2008, with the proviso that the 1992 local elections could not be mapped because of the lack of reliability of the statistical data. Particular mention must also be made for the year 1996, which was a very special electoral year due to the fact that in certain cases local elections were carried out over three ballots as a consequence of the incompletely adapted legislation and of a lack of experience in the field. The requirement for a further ballot to be held if turnout did not reach the 50% threshold, together with certain second-ballot situations, made these elections the most complicated local elections in Romania in the whole period since 1989. Referenda are also investigated.

In the first electoral cycles presidential and parliamentary elections were held simultaneously, which may lead to discussions on the influences that may exist between the two types of elections. An ideal way was to opt for their separation (as the voice of the civil society required at a certain point) but it was not desired both for political reasons (ruling parties clearly understood the benefits they could enjoy by overlapping the two ballots) and economic ones (double costs for different ballots). Finally they changed the length of the presidential term in office from four to five years, 2004 elections being the last ones in the Romanian history to hold presidential and parliamentary elections at the same time. Their splitting brought about a plus for the democratic system and a chance to have a president not necessarily with the same ideological orientation as the winning party/parties, thus ensuring a greater balance at the level of the state powers, although Romania is not a presidential republic.

Resorting to referenda is another clear sign of a functional democracy. Although this type of vote has not very often been used after 1990 and even when it was, it did not always have the desired effect (that is the implementation by the powers of the state of the results of the referendum), it represents an interesting option with extremely diverse stakes (such as the validation of the Constitution, the necessity of changing it, the adoption of some decisions such as the shift to a unicameral parliament or the reduction of the number of parliamentarians to a maximum of 300, the impeachment of the president, etc.). The 1991 constitutional referendum could not be analyzed on the basic administrative unit level, since no database is available. The referenda held in 2003, 2007 (two) and 2009 (three) were subjected to a thorough area-by-area analysis.

It was not by accident that some referenda were held at the same time with certain (presidential) elections, taking advantage of the positive influence of the questions on the referendum voting-paper addressed to electors, as it was the case of the year 2009, when the referendum was organized simultaneously with the presidential elections. The President can set the date of the referendum and the fact that the incumbent president overlapped the two types of votes was regarded by the civil society as an advantage for his part in the vote since the referendum questions clearly favored him, being able to induce the population to vote him as president. *Against the background of a decline in the confidence in the political class, the Romanian population expressed, by means of the referendum, its desire to reduce the number of MPs and the change of the bicameral parliament into a unicameral one.*

The final category of elections presented in this paper derives from Romania's entry into the European Union on 1 January 2007. The 2007 and 2009 European parliamentary elections are illustrated and analyzed.

3. Sources of data and information

The difficulties involved in working out a database of such a caliber were relative but persistent. The main sources were the National Institute of Statistics and the Central Electoral Bureau. We regret the fact that we were not able to make use of the data mentioned there as missing or irrecoverable.

Although we deal with a relatively recent period of time, the statistical data on the results of the various electoral processes held between 1990 and 2009 were difficult to find, especially for the period 1990-1992. For 1990, the statistics on the parliamentary and presidential elections in May 1990 could only be recovered at the county level (the county being the largest administrative unit in Romania), the data on the commune level being impossible to find. This may indicate a precarious organization of the electoral process or even a possible attempt at concealing possible frauds. Those elections were won with a comfortable majority by the political party which included on its list people who had posed as revolution leaders. The former historical parties, which had been abolished by communists and re-established immediately after 1990 by former dissidents, ranked poorly. A possible cause could be their weak media promotion, electors hardly knowing them.

4. The decline in vote turnout

While the turnout in the 1990 parliamentary and presidential elections, the first free elections held after the collapse of communism, proved the enthusiasm of the population for this process (over 85%), in the next elections the turnout phenomenon recorded a regressive trend, reaching to the threshold of about 39% in the case of the 2008 parliamentary elections and to 54% in the first ballot of the 2009 presidential elections and 57% in the second one.

However, the referendum recorded a different evolution trend. In 1991, the turnout was of 67%, the tendency being also regressive until 2007, although with two special situations. In the 2007 referendum on the impeachment of the Romanian President, 44.5% of the population cast their vote, while the referendum on the introduction of the uninominal vote the turnout was only of 26.5%. The stakes of the 2009 referendum on the reduction of the number of MPs and replacement of the bicameral parliament with a unicameral one caused a higher turnout (50.2%), thus breaking the downward trend of the evolution of this indicator recorded in the case of parliamentary and even presidential elections.

The low turnout phenomenon is also characteristic to other countries and it can be rooted in various causes: the poor performance of the political class as opposed to the electors' expectations; the adoption of a defeatist behav-

ior in relation to the election results; election stakes (Euro-parliamentary elections generally have a smaller stake for voters in comparison to local elections, for example); the simultaneous organization of different types of elections (parliamentary and presidential elections, referenda and presidential elections) brings about a higher turnout in certain types of elections, although people's interest in them, if held separately, would have been lower; the poor implementation of governance, different political contexts associated with the economic performances of a country, the season during which elections are scheduled, the residential environment the electors live in (rural voters are more disciplined and responsible, participating in a larger number in the electoral process), voters' age (turnout is higher in the case of old people), etc. In this context we deal with a paradox: during the communist period, the population was somehow forced to participate in the electoral process, whose outcome was known in advance, while after 1990, although enjoying the possibility of freely casting their vote, people experienced a demobilization with complex explanations with personal or societal shades.

The introduction of the blank vote in certain elections (such as the ones held in 2008 and 2009) may reflect, to a certain extent, the voters' disgust, allowing the quantification of the dissatisfied part of the electorate. However, even under these circumstances, the turnout did not significantly increase.

It is more than obvious that the poor turnout problem in Romania is pre-occupying and it may lead to discussions on introducing compulsory voting (in 2012 there was such an initiative following the Belgian example). Although democracy cannot be exercised coercively, taking into consideration the youth of the Romanian democracy, such a possibility would maybe empower electors, forcing them to participate in a higher percentage in the elections, including in relation to certain citizens' legislative initiatives.

5. Between ambiguous ideology and voting pattern type

Looking back at the whole analyzed period, it can be noticed that the political parties in Romania, although quite clearly assuming their left-wing, center or right-wing position on the political spectrum, suffer from ideological substance. Quite often their program is not as well oriented as they claim, promoting right-wing measures although pretending to belong to the left-wing and vice versa. This ideological inconsistency can be explained through the youth of the Romanian democracy and the desire to grab a higher share of the electorate. Especially when it comes to presidential elections, studies have proved this "attraction" of a part of the electorate, other

than the one typical of the party that supports the president. Ideological ambiguity is also obvious when we refer to European Parliament affiliations, certain Romanian parties being aggregated to parliamentary groups with which they have no obvious doctrine relations, pragmatic connections being the ones that seem to matter more.

This ideological overlapping is somewhat normal for a young democracy because the transition from a single ideology (the communist one) to multi-partism has sometimes crowded parties on certain ideological segments or have made them be attracted by certain ideas at least hoping that a part of the electorate will be thus “seduced”, while the other part, loyal to its assumed ideology, will not notice this deviation. The idea that parties must permanently revise their ideology because of the political competition is not necessarily an excuse but the need for adaption to a new speech, to a doctrine and ideology re-positioning so that that the more or less loyal electorate gets educated in the sense of an evolution. The topic is a sensitive one and it involves the ideological awareness of this electorate. Apart from some of the old electors, who historically support right-wing parties, young voters, who lack historical roots, are more cynical and fluctuating in their choices. The problem is that older electors generally crowd in the sphere of the left-wing parties, an evolution which is somewhat normal if we consider their dependence on the social measures promoted by these parties.

At the regional level, Romanian elections generally follow certain patterns, as proved by most elections (with very few exceptions). Consequently, the counties in the East and South favor left-wing parties, due to the good representation of a rural population which is rather opaque to mass media but also to the fact that we deal here with a captive electorate against the background of a poverty level which is higher than in other parts of Romania. Transylvanian counties, with few exceptions (those marked by the presence of some heavy industry sectors) favor right-wing parties. The explanations reside in the higher living standard and degree of urbanization, as well as in the better access to media information. Immediately after 1990, nationalist and extreme right-wing parties managed to get a significant number of votes, culminating with the entry into the second round of 2000 presidential elections of a right-wing political leader who was defeated only through the strong mobilization of the electorate (who gave him a negative vote). However, the appetite for such electoral sympathies (perhaps also due to the integration in the EU) has gradually decreased, at present extremist parties being no longer represented in the Parliament. Electors who used to support extreme parties have shifted towards populists or have joined those who do not want to cast their vote.

6. Voting cleavages

Romania has inherited many elements that date back to the communist period and which have brought about various problems: a rather complex economic situation triggered by the transition from a centralized to a market economy, social problems caused by the emergence of unemployment and poverty, an institutional culture adapted to European norms, an European integration (since 2007) with a major impact on multiple levels, etc. All these obviously influence citizens' votes, inevitably leading to the appearance of some interesting cleavages: rural-urban, left-right, center-periphery, East-West, Romanians-Hungarians. But, regardless of the type of cleavage, there is a strong relation to space.

The left-right cleavage is also related to space, since there is an obvious preference of Transylvanian electors for the right wing, while those in the East and South favor the left wing. From this point of view we can reveal a certain connection between the economic and entrepreneurial level and the right wing on the one hand, and between the dependence on the state social policies and the left wing, on the other hand. Lower accessibility from the economic and even spatial point of view keeps the left electorate captive. This context gets even more complicated when speaking about the ideological ambiguity and amalgamation of some parties which officially have a certain political orientation, but their messages belong to the opposite ideology. Even under these circumstances, the elections that have taken place in Romania since 1990 stand out through a certain *status-quo*. The roots can be either historical (cooperativism – an individual initiative; historical heritage of parties – Neocommunist parties) or more recent, resulting from the adaptation to the complex post-communist social and economic situation. Self-called center-right or center-left parties are merely attempts at occupying a distinct political position, in reality ending up by having either left or right orientations as a consequence of setting up either political alliances or fusions with other parties.

The center-periphery cleavage is a little more subtle since almost the entire political system in Romania depends on the Center. The introduction of the so-called uninominal vote in 2008 parliamentary elections is a reaction to the society's criticism against the fact the political decisions in Romania are always taken at the Center, people hoping that in this way the influence of the Center will get diluted while the role played by local actors will get more important. In reality, this phenomenon has not happened, the Center still focusing decisions by supporting certain candidates. A negative element of the initiative represented by the uninominal vote was the success recorded by politicians with much notoriety but with no political experience (such folk or pop singers, actors, sportsmen, etc.).

The rural-urban cleavage is perhaps the most prominent within the Romanian political landscape. There is a certain development opposition between the two environments: a more traditionalist rural environment, less developed, with a lower educational level and a difficult access to mass media and a more modern urban environment, open to innovation and free initiative. However, in the case of the latter, we can also bring forward some amendments, especially for the period before 2000, when unemployment recorded rather high rates, people's votes being primarily oriented towards the left wing. In Romania, on the whole, rural population favors left-wing parties, while urban population supports the right-wing ones. Of course, there are differences between large cities and small towns, whose political behavior is closer to rural characteristics. On the other hand, once the Christian Democratic National Peasants' Party failed to enter the Parliament, there have been no other parties to almost exclusively address the rural world. The orientation of these parties is rather general, without making a segregation between rural and urban, although there are conservatism elements intended for the rural population and modernism aspects for the urban people, even though the differentiation between them is not explicit.

The internal-external cleavage is getting more and more obvious when it comes to the last elections, not infrequently the votes expressed by the Diaspora tilting the balance in favor of a particular candidate in the presidential elections (as it happened in 2004 and 2009). This cleavage is the result of an important migratory flow towards Western Europe and North America where, according to some evaluations, more than 3 million voting Romanians live.

Many times, the various political cleavages overlap certain segments, being therefore difficult to highlight them. The phrase used by one of the candidates in 2004 presidential elections ("two Romanias that cast their vote") expresses a reality, the classical binary cleavage sometimes changing into a ternary one.

7. Conclusions¹

The Romanian electoral post-revolutionary landscape can be characterized as interesting and paradoxical at the same time, bearing the direct influence of the society realities and the international political and economic evolutions. Half a century of communism touched the most sensitive chords in the free nature of Romanian citizens, altered their mentality and confined it within hierarchies and philosophies under which everyday existence became much more important than party political interests, the ruling class or what lay beyond the country's hermetically sealed frontiers.

A young democracy involves the shaping of a new political class, which takes several years at least. It is obvious that Western-type thinking was by no means habitual among ordinary Romanians in the first years after 1989. The infusion of Western ways that was attempted by certain prominent figures in the historical parties had no chance of succeeding precisely because of the democracy gap.

Romania's longest-serving and most popular president to date has been Ion Iliescu (a former activist in the Communist Party), who had an undeniable impact on Romanian political life through his three terms as President (12 years in total: 1990-1992, 1992-1996 and 2000-2004) and also by his presence on the political stage as a member of Parliament and of the wider leadership of the PSD. The second president who has made his mark on the political scene, from the point of view of the length of his time in office, is Traian Băsescu, the first president to be elected for two consecutive constitutional mandates (2004-2009; 2009-2014) and, in his own words, "a player-president". Both of these presidents have played the role of proponents of the parties they had come from. It is precisely at this point that we may observe the immaturity of an electorate that refuses to cast a strategic vote in order to divide the powers and to establish equilibrium in this regard. A special case is that of President Emil Constantinescu. So far, he has been the only president to win only one mandate (1996-2000), as he declined to run for a second term.

At the *party level*, the political scene has been dominated by a number of parties, political alliances and coalitions. Here we must make a distinction between different types of elections. In parliamentary elections, coalitions

¹ This part of the paper is a summary of findings from the Electoral Atlas of Romania: 1990-2009 published by "Alexandru Ioan Cuza" University Publishing House, Iasi, Romania (Iațu et. al, 2013).

or alliances of parties have sometimes been preferred for a variety of reasons: obtaining all kinds of advantages or simply the setting up of a strong opposition intended to counterbalance the party or coalition in government at a certain point in time. In local elections, parties have generally preferred to compete independently in order to test their capacity of getting votes and later on negotiate their place in an alliance in the perspective of general elections.

From the point of view of party representation and of the interaction between the party framework and the electoral system, we can find only minimum effects of disproportionality for a limited multi-party system. In this respect, a relative number of three to five political parties operating within a hybrid system of vote transfer tends to produce an optimal outworking of electoral dynamics. However, besides the purely mechanical aspect of the correlation, we can also appreciate the limitations imposed by both the ideological amalgam and the lack of orientation and programmatic perspective. The presence of a number of “catch all” parties on the Romanian political scene suggests a high degree of vulnerability, to which we can add a hybrid cultural pattern that vacillates between social participation and deference. A rational approach to political doctrine and a better match between ideology and political projects would represent a solution to the ideological amalgam and to partisan tendencies that are hegemonic in nature.

The existence of a bicameral parliament does not appear to be justified, since the Senate and the Chamber of Deputies, with very few exceptions (1990, 1996), have normally both been controlled by the same political grouping. But the very existence of a dispute between the two chambers as to the role to be played by each of them is an obvious sign of an attempt at jockeying for political advantage. From a statistical point of view, the need for civic representation is more than met within a bicameral structure. Many arguments related to territorial-administrative centralization and to linguistic and cultural appropriateness would have as their natural outcome the adoption of a unicameral legislative structure.

While in the first post-Revolution legislatures the support given to the governing party or parties was almost unanimous (Iașu, 2004), as a consequence of inherited mentalities, after 1996 the situation became much more nuanced. A heterogeneously constructed Christian-democratic alliance that held power from 1996 to 2000 was not able to stand up to the pressures that confronted it from multiple directions (ideological, party-related, economic, ethnic, etc.). In the course of these power games in which some political groupings became aware of the importance of their support, it is the party of the Hungarian minority (UDMR) that has stood out from the rest. Its almost continuous involvement in government from 1996 onwards, irrespective of whether the administration was one of the right or the left, and its obstinate pursuit of certain well-focused objectives, displays a political

party operating on the most pragmatic ethnic basis. The Constitution guarantees seats in the Romanian Parliament (in the Chamber of Deputies) for 18 minorities that live in the country. This is a further feature that makes the Romanian Constitution one of the European constitutions that is most favorable to minorities.

The debate over whether Romania should have a bicameral or a unicameral parliament, which was brought into the public domain by the holding of a national referendum at a certain point in time for reasons related to political pragmatism, has remained suspended somewhere in the extremely rarefied political atmosphere. This is because, even though there was an overwhelming majority in favor of a unicameral parliament, no political force has as yet had the will to put the change into practice. The reduction in the number of members of parliament has not been carried through either, because of tacit complicity between the government and the opposition.

Most of the time local elections have been influenced by national electoral confrontations, local communities only rarely casting their vote by virtue of what happens at the local level in respect of administration performances. It is for this reason that there appears an almost perfect overlapping between the results obtained by a political group in the local and national elections. This also happens because, against the background of an evident lack of decentralization, the relations between the center and local representatives have been umbilical in nature. Furthermore, the phenomenon of the migration of mayors from one political party to another is extremely widespread, the reason being a very simple one: by taking shelter under the umbrella of the party or political forces in government, one can more easily gain access to (financial and other) resources. This is a further illustration both of the ideological ambiguity of parties and politicians and also of an obvious dependence on decisions taken at the center.

The elections for the European Parliament mark Romania's integration into the structures of the European Union. However, the two sets of elections (in 2007 and 2009) reveal a definite gap between the population's level of interest in major European issues and that devoted to major national ones (the latter being much more pressing and with far more perceptible effects). This explains why turnout in these elections was not very high. On the other hand, with few exceptions, the parties did not nominate their most visible representatives, since such people preferred to remain on the domestic political stage, which also offers greater chances of achieving fame.

The referenda which have taken place in post-December 1989 Romania display a voting public that is ready to be seduced by the discourse of the person or persons initiating them, and, even though the answers to the questions posed at these referenda were very clear, the political class seems to have been afflicted with amnesia when it came to the putting into effect

of what the population had decided. The way this type of voting process typical of participatory democracy went showed that it will be necessary to change the law regarding referenda by adapting it more effectively to Romanian realities, as the turnout continued to decline, just as it was to do in the other types of elections.

The action of “peeling away the layers” realized through this temporal and spatial “film clip” has also been conceived as an interdisciplinary approach, with the normal format of an atlas being stretched due to the objective need for better understanding, particularly for the reader who is not accustomed to the political and electoral struggles typical of a country such as Romania.

References

- Corneliu Iașu, (2004) *La géographie électorale de la Roumanie entre démocratie, transition et racines historiques*, Troisièmes Rencontres du Groupe A.D.R.E.T. (Analyse de la Démocratie, des Représentations, des Elections et des Territoires), Caen, France.
- Corneliu Iașu (coord.)*, Ionel Boamfă, Ciprian Alupului, Sebastian Năstuță, Silviu Petru Grecu, Romeo Asiminei, Raluca Ioana Horea-Șerban, Voicu Bodocan, Aurelian Giugăl, Cătălin Timofciuc (2013) *Atlasul electoral al României: 1990-2009/ Atlas électoral de la Roumanie: 1990-2009/ Electoral Atlas of Romania: 1990-2009*, "ALEXANDRU IOAN CUZA" University Publishing House, Iasi, Romania.

The new «Graphical-statistical Atlas of Switzerland 1914–2014»

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Abstract. At the time and in close symbiosis with the emerging of modern national states in Europe and the Americas around the mid-19th century, public statistics as a democratic, unbiased source of information for a civil society gained an enormous importance. The desire for deeper analysis and general publication of the rapidly expanding statistical results promoted and developed a series of indispensable «auxiliary» sciences for this purpose, including the field of graphical visualization and thematic cartography. Then as now, statistics and in particular large censuses, such as the population and enterprise census, with their broad and at the same time regionalized data bases, are the main source of statistical visualizations. It was the application of their results, which led to many new graphic and cartographic representation methods, as we know them today.

Statistical atlases combine and portray these regional data perfectly and make stunning *stories out of millions of individual data cells*. They often provide in a very compact form and simple, clear manner, remarkable stories about the state and the development of our ever-changing society. That this issue – «visual storytelling» and simultaneous popularization of often dry statistical results – that did not only arise in the context of a modern information society, has been impressively demonstrated by the then Statistical Bureau in its 1914 «*Graphical-statistical Atlas of Switzerland*». After diverse initiatives and some smaller atlas editions by the Federal Statistical Bureau and by private persons during the 19th century, this comprehensive thematic atlas was finally published and presented at the National Exhibition in Bern, just a few weeks before the start of the First World War.

With 51 consistently colored panels in large folio format, including 24 maps and 27 chart tables, the atlas still offers impressive facts and *insights into the social reality in Switzerland* at the turn of the century and up to the time immediately before the start of World War I. Both, in terms of the wealth of its data and the quality of the graphics, the atlas forms a highlight

of the early heyday of statistical atlases in Europe. Besides its importance for the publication series of the Swiss Federal Statistical System, it was truly groundbreaking as one of the first and most comprehensive thematic national atlases in Switzerland and for the development of thematic cartography in the country in general.

On the occasion of the *100th publication anniversary* of this impressive atlas, which is only difficult to obtain nowadays in libraries or antiquarian book-stores, the Federal Statistical Office decided to fully reproduce this work and make it available again to the public. In the awareness that exciting stories especially always arise when statistics are not only compared regionally, but over a very long period, the original panels of 1914 were – in a first-time approach – complemented by the statistical maps and diagrams with current figures as of 2014 (*Figure 1*). In this sense, the publication invites the reader, as a «supplementary delivery» to a *greater journey through time and society*, which is hopefully appreciated.

Keywords. Atlases, Thematic mapping, Statistical mapping, Statistics, Historical statistics, History of Thematic cartography

1. Introduction

In 2015 the Swiss Federal Statistical Office (FSO) celebrates already 125 years of map use in its diverse publications – a truly long and rich tradition in the international context, which is of course being continued and currently enforced by numerous on-line and mobile mapping applications showing the latest statistical data. Colored maps and atlases have always accompanied for instance the Statistical Yearbook and other large FSO publications, often explaining the (sometimes complex) world of statistics in a very simple, visual way for the consumption by a large public audience.

The 1914 «Graphic-statistical Atlas of Switzerland» marks a brilliant climax of the early period of statistical visualizations in Switzerland, which suffered – like in many other countries – a sudden interruption with the onset of the First World War which still lasted for many decades after. The atlas combines in a loose sequence of maps, graphs and charts the essential regional statistical information then available, which were usually often scattered in various individual publications. By doing so, it offered for the first time a comprehensive (visual) summary of the numerous censuses, results and topics of official Swiss statistics at the beginning of the 20th century.

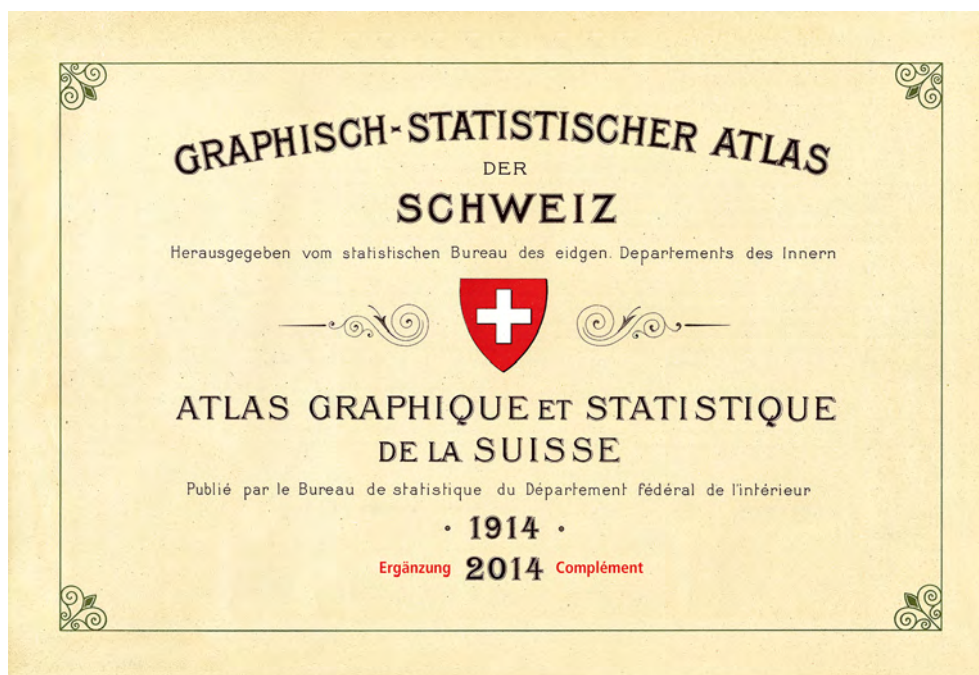


Figure 1. Atlas cover and title page of the new «Graphical-statistical Atlas of Switzerland 1914–2014».

2. The 1914 «Graphical-statistical Atlas of Switzerland» and its significance

2.1. The evolution of statistical atlases at the end of the 19th and beginning of the 20th century

The atlas joins – in time and methodology – a group of very similar foreign atlas publications which were edited over roughly five decades between the French-German War of 1870/71 and the First World War in almost all European¹ and many non-European² countries, which at this time became aware of their nationhood. All these works were indeed prestige publications of the then still young statistical offices, which wanted to promote their growing results and showcase their usefulness for society (i.e. both – the usefulness of the results and the institutions). So, it is no wonder that almost all of the first statistical atlases were produced in very high quality

¹ Russia 1873, German Empire 1876-78, France 1878, Portugal 1881, United Kingdom 1882, Austrian Empire 1882-87, Belgium 1899, Prussia 1905, Finland 1908

² Argentina 1873, United States 1874, Mexico 1886, India 1886, Japan 1902

and large format, using always color printing and being decorated with expensive, often individually designed covers, bearing the predicates «album» or «graphical» in their titles. Alike the glamorous presentations of many individual thematic maps and graphs at the various statistical and geographical conferences of the late 19th century, also the new statistical atlases were mostly edited in time for special occasions like world or national exhibitions or in conjunction with certain anniversaries, so as to gain as much publicity as possible. They were often also co-edited with renowned cartographic publishing houses (e.g. Kümmerly & Frey) in order to use these distribution channels.

2.2. A first comprehensive statistical atlas for Switzerland

After many attempts by the Confederation itself as well as private individuals, the Federal Statistical Bureau finally took the third National Exhibition of 1914 in Bern as an opportunity to edit a first large statistical atlas for Switzerland. The atlas contains in a folio format of 41.5 x 27.5 in 10 chapters altogether 24 thematic maps and 27 statistical graphs and charts (*Figure 2*). The data comes from censuses and surveys from the first decade of the 20th century and the whole second half of the 19th century and offer already large time series (60 to 70 years) for some topics, mainly population. Some of the data was freshly collected in 1913 and integrated only days before the printing took place.

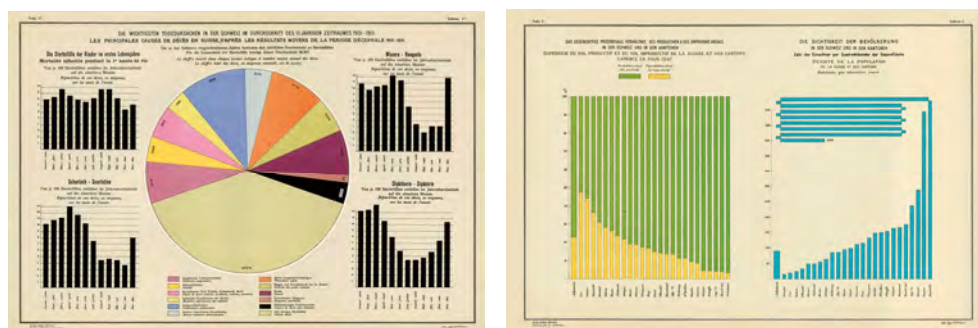


Figure 2a/b. Original graphs from the 1914 atlas (Table 3 – Land Use; Table 17 – Causes of Death 1901-1910).

The consistently bilingual atlas (German and French) was finally printed in 300 copies and sold for 16 Swiss Francs (SFR), with reduced price for schools: 10 SFR. This is, taking into consideration the price inflation of the last 100 years, equivalent to nowadays approximately 147 SFR (in the case of the reduced price: 92 SFR). However, already at the National Exhibition of 1914, a large number of atlas copies were given away for free to prominent visitors and schools. The contract for producing the atlas tables using high quality chromolithographic processes was given to two well-known Swiss companies in this field: all maps were produced by the Geographisch-

artistische Anstalt Kümmerly & Frey; all charts and graphs were realized by the Lithographische Kunstanstalt Lips. The printing and binding of the atlas itself – as well as the cover design – and the final distribution was given to Stämpfli & Cie. in Bern, which edited also many other publications of the Statistical Bureau between 1891 and 1931.

2.3. The atlas in the context of other Swiss atlas publications

The 1914 «Graphical-statistical Atlas of Switzerland» constitutes a milestone publication not only for the early period of official statistics, but first of all for the development of atlas cartography in Switzerland in the 19th and 20th century. The atlas is one of the first thematic country atlases³ showing most aspects of the society and economy – and for sure the largest Swiss thematic atlas produced until 1914. It remained also the most comprehensive thematic atlas in Switzerland until the middle of the 20th century, when the first National Atlas, the «Atlas of Switzerland», was finally published by Eduard Imhof (1965) and ETH (Eidgenössische Technische Hochschule) Zurich.

3. Reprint and «supplementary delivery» 2014

3.1. The idea

The «new» atlas edition is the result of a long-time fascination and admiration shared by some colleagues working today in the cartography department of FSO for the beautiful and detailed maps and graphs produced by the office a hundred or more years ago. In high respect and honor of the outstanding achievements of our former colleagues who produced these illustrations under very different circumstances and with very different technologies (and many more time and cost restraints) long before standard textbooks on Thematic cartography or graphic design were written, the idea grew to reprint all of these plates from the 1914 atlas. Finally, on the occasion of the 100th publication anniversary of this impressive atlas, which is very difficult to obtain nowadays in libraries or antiquarian bookstores, the Federal Statistical Office decided to fully reprint this work and thus make it available to the interested public.

On behalf of many customers who often searched for the old maps and graphs, all plates were already scanned in high resolution in 2006 and

³ First attempts for thematic atlases containing some statistical maps have been made earlier by Vögelin & Meyer (1846–68), Gerster (1872) and Attinger (1907–08); larger monothematic atlases (10-15 pages) were edited by Wartmann (1873, commerce statistics), Anderegg (1884, agricultural statistics) and SBB & Post (1915, transport statistics)

made available for free in the Historical statistical collection as well as the map archive on the FSO website. Furthermore, in 2006 a CD-ROM containing the 1897 and the 1914 atlas plates as well as all yearbook maps from the 1890s and 1900s was published with an interactive surface to easily access the illustrations. Since then, especially around the 150th anniversary of the Statistical Office (2010), even more requests arrived in the office, which also asked for a full paper reprint of the atlas at its original size (*Figure 3*).

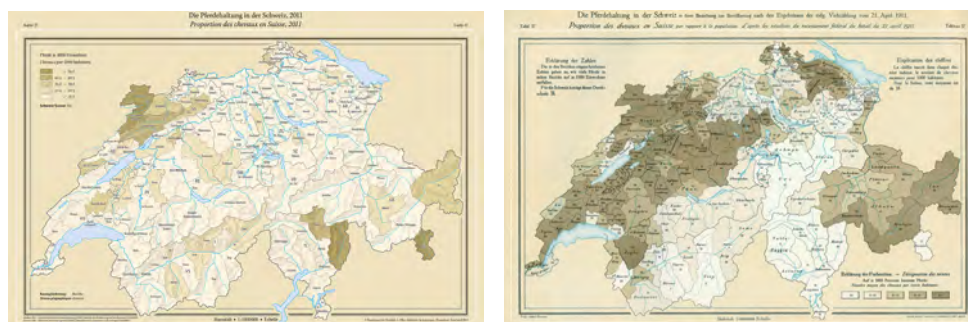


Figure 3a/b. Old and new maps for the same topic – Number of horses per inhabitant (Table 37 – 1911, Map 37 – 2011).

3.2. The implementation

Long before the decision to reproduce the original atlas was taken, it was clear for the new authors, who all generate thematic maps and graphs with new statistical data every day, that it would indeed be appealing to not only reissue the old plates, but contrast and supplement them with new statistical results for exactly the same topics. This would immediately enable the reader, apart from a profound study of the societal and economic situation a hundred years ago, to compare the regional structures now and then and study their – in many cases – dramatic evolution over time.

In addition to this already high analytical value – and in contrast to many other atlas publications dealing with historical statistics – the authors decided to add yet further value to the new publication by strictly preserving the original atlas layout and page compositions also for plates showing new statistical data from 2014. The atlas is not understood as a completely new atlas (which it cannot be), but as a mere «supplementary delivery», which still focuses on the 1914 atlas. It is the author's conviction, that the well-designed and harmonic original layout – in the true charm and character of the beginning 20th century – is indeed timeless and still (or even more) attractive to readers today. On top of that, the atlas has been compiled under the strict assumption, that old and new illustrations should be comparable instantaneously and be free from bias, including changes in styles and layout, which do only distract the reader's eyes from the facts.

In this sense, the «new» atlas looks very much like the «old»: it consists of the very same format, size and paper and applies the same fonts and styles to all pages. The cover is an exact reproduction of the original atlas cover. A deliberate change has been made to the printing, so the atlas is printed double-sided. The back-pages of the 1914 plates do now contain the illustrations with new data from 2014. By doing this, the volume and weight of the atlas remain the same – although having twice as much content than the original did.

4. Content structure of the «new» atlas

The original atlas of 1914 contains 10 chapters, which represent exactly the 10 social and economic fields for which the former Statistical Bureau (cf. also the Swiss Statistical Yearbooks) collected data at the time. This structure (*Table 1*), which groups the 51 plates/themes, was kept unchanged for the new atlas edition 1914-2014, although modern statistics usually use more and more specified thematic fields (Switzerland currently: 21).

I. Land use	II. Population
III. Population movement and change	IV. Military
V. Education	VI. Agriculture
VII. Industry and commerce	VIII. Transport
IX. Public finances	X. Political statistics

Table 1. Chapters and content structure of the 1914 and 2014 atlas.

Wherever possible, one new illustration exactly complements one original illustration from 1914 (*Figures 3 and 4*). To enable direct comparisons, usually the old and new plate are affixed opposite to each other without the need to turn over pages for the reader when viewing maps or graphs. As the page layouts are identical and some of the new illustrations exactly match their original counterpart, it is not always easy to identify immediately old and new ones. For this reason, the original illustrations carry the label «*Tafel/tableau*» (plate), while new illustrations are labeled as either «*Karte/carte*» (map) respectively «*Diagramm/e*» (graph), which is also explained and pointed out in the *Table of Contents*. The numbers behind are of course identical.

Unfortunately, it was not in all cases possible to supplement every original plate with new data visualizations, as for some topics no new data or no new detailed regional data were available. This can be due to several reasons. Some topics, for example, are not surveyed any more by official statistics (e.g. military statistics). In other cases – fortunately – the topic itself has virtually disappeared from the map for example the topic of tuberculosis as cause of death. The statistical methods applied have been changing, so that

some results cannot be compared 1:1 any more or would need numerous explanations and footnotes on the map. In order to bridge this gap, in some cases the authors attempted to supplement a topic that ceased to exist by a similar topic that could be of interest for current statistical questions (in plate 18 for example *tuberculosis* was replaced by *dementia* as cause of death, which is a much more common issue nowadays).

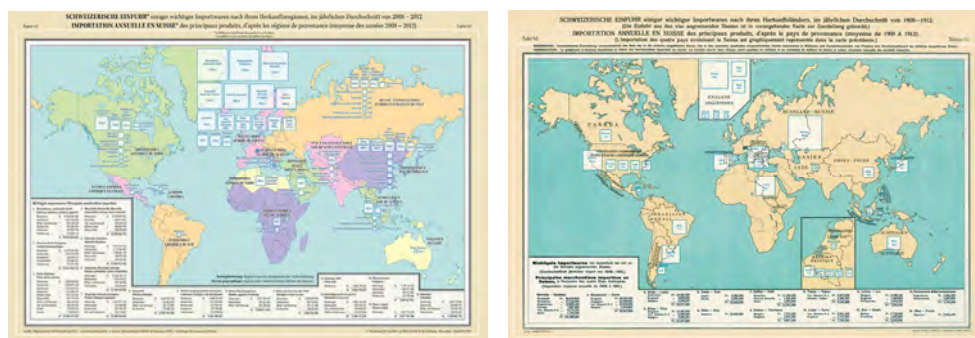


Figure 4a/b. Old and new maps for the same topic – Swiss Imports worldwide (Table 43 – 1908-12, Map 43 – 2008-12).

Changes were made to some plates which originally showed graph and chart representations. Due to cost restraints, a lot of the 1914 plates show regional data in simple and repeating diagram patterns, often 26 times next to each other in order to represent every canton and placed there in alphabetical rather than spatially sensible order. These topics can today be visualized much more efficiently by the means of a thematic map – showing the statistical values and their regional distribution simultaneously. So to speak, the «new atlas» is even more a true atlas than the original work, with about 15% more maps (plates 2, 3, 4, 7 and 51) than the original. By applying these slight changes, the current authors hope to not only add value to the illustrations for the contemporary reader, but also act in the sense of the original authors who did not have the (financial) means to produce as many maps out of the available regional statistical data.

5. Textual explanations – the 1915 supplement

In 1915, a 38-page supplement for the atlas in A5 format with textual information and additional tables was published by the Statistical Bureau, and is also part of the 1915 yearbook. Herein, some plates were further explained by a commentary from experts in the office, as apparently some readers had asked for this. The explanations are not consistent, and their length varies from plate to plate. This first supplement, which is even rarer than the original atlas, has been fully reprinted and now forms part of the new «Graphical-statistical Atlas of Switzerland 1914–2014».

The authors have deliberately refrained from writing a new textual supplement for the maps and graphs as of 2014. On the one hand, the topics in the atlas did not change, and many of the old explanations are still valid today (like the one on population themes). On the other hand, numerous additional and background information is available on-line on the Statistical Bureau website and as well as in other publications, especially new and up-to-date tables. Finally the maps and graphs were designed to speak for themselves and to be understood immediately by everybody. If a map does not aspire this, it is not considered a good map. In the rare cases, where footnotes are necessary to avoid misinterpretation, for example in the case of closely related topics, these footnotes and explanations were affixed directly in the maps, close to the legend.

6. Conclusion

The «Graphical-statistical Atlas of Switzerland 1914–2014» is more than a simple reprint of a number of old statistical maps. The rare occasion, that an atlas is being reprinted and supplemented exactly 100 years after its first publication, makes it special – from a statistical and cartographic point of view – also beyond the borders of Switzerland. With its approximately 100 maps, graphs and charts from almost three centuries the atlas does *story-telling* at its best. It invites the reader to undertake a true journey through time – not only through Switzerland, but also through other modern nations, as many countries share the very same phenomena. It structures mounts of data and converts them into attractive and compact images that enable readers to swiftly understand regional disparities in the past and present, to follow and understand the dynamics and changes that affected and currently affect our society and economy and are behind every statistical data set. In democratic societies, which are changing faster than ever, it helps the general public to better comprehend these changes and their directions and finally make unbiased, fact-based decisions for themselves and for the state.

References

- Arnberger, E (1966) Handbuch der Thematischen Kartographie. Vienna
Dickinson, GC (1963) Statistical mapping and the presentation of statistics. Arnold, London
Federal Statistical Office (1993) Zur Geschichte der eidgenössischen Volkszählung. Bern
Funkhouser, HG (1938) Historical development of the graphical representation of statistical data. In: G. Sarton, pp. 269-404
Graphisch-statistischer Atlas der Schweiz / Atlas graphique et statistique de la Suisse (1897). Hrsg. vom Statistischen Bureau des eidg. Departements des Innern / Publié par le Bureau de statistique du Département fédéral de l'intérieur. Verlag Stämpfli & Cie, Bern

- Graphisch-statistischer Atlas der Schweiz / Atlas graphique et statistique de la Suisse (1914). Hrsg. vom Statistischen Bureau des eidg. Departements des Innern / Publié par le Bureau de statistique du Département fédéral de l'intérieur. Verlag Stämpfli & Cie, Bern
- Grob, R (1941) Geschichte der Schweizerischen Kartographie. Bern
- Imhof, E (1972) Thematische Kartographie. De Gruyter, Berlin
- Kretschmer, I (1989) Die Entwicklung der Methodenlehre der thematischen Kartographie bis in die 1960er Jahre. Vienna
- Mood, F (1946) The Rise of Official Statistical Cartography in Austria, Prussia, and the United States, 1855-1872. In: Agricultural History. 20 (1946), p. 209-225
- Roth-Kim, J (1965) Schweizerische Landesatlanten aus dem 19. und dem frühen 20. Jahrhundert. In: Geographica Helvetica. 21 (1966), pp. 105-110
- Schulz, T (2012) The Statistical Atlases of Switzerland and their Atlas CMS. In: Jobst M (ed.) Service-Oriented Mapping 2012, Vienna, pp. 453–469
- Schulz, T (2013) The Statistical Atlas. Studies on classificatory, conceptual, formal, technical and communication aspects. Technical University of Dresden, Dresden
- Witt, W (1970) Thematische Kartographie. Methoden und Probleme, Tendenzen und Aufgaben. 2nd ed. Gebr. Jänecke, Hannover

Statistical Atlases – Travel guides through our Societies

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Abstract. For more than 150 years official statistical institutions have been issuing large thematic atlases that portray social and economic facts about countries, regions or cities. Currently, about 2500 statistical atlases can be found in printed or on-line bibliographies. However, these works have almost never played a role in scientific studies, be it statistics or cartography. The author tried to fill this gap with his thesis, especially in the field of thematic and atlas cartography. The character, historical development, role and current features of this atlas type were intensely analyzed. Altogether, twenty statistical atlases with more than 6000 individual maps were representatively selected in this context for a detailed quantitative empirical analysis. These maps were examined for patterns and irregularities concerning their contents, layouts, technologies and communication aspects.

Within the special *framework of rules and laws of public statistics*, that influence the atlases from the publisher's side, and general classificatory features, four essential parameters could be identified, which single out the *Statistical Atlas* from the plethora of other atlases. These are the following: unique contents, topicality, source and publisher. Based upon these, a fundamental clarification of the term «*Statistical Atlas*» could be achieved, followed by a *new definition*. Such atlases were then dissociated from other atlas types, such as national, regional or planning atlases. Eventually, a *new atlas classification* could be set up, which comprises the *Statistical Atlas*, and which can be of great use for libraries and bibliographies alike.

In the context of this work, also a *bibliography of statistical atlases* with app. 850 titles was established. Together with inputs from the history of statistics and cartography, it helped to explain the historical and societal background as well as motivations on the institutional side to publish such atlases at certain times. Altogether, *eight historical periods* could clearly be identified, that characterize the evolution of this type of atlas since the first issue of a *Statistical Atlas* around 1818.

In the scope of the fundamental evolution of our *current information society* and its impact on all of us, the reception and acceptance of official statistical publications depend (again) largely on the high quality presentation of their contents, esp. by the means of visual information modules. Maps and atlases have experienced a true revival in statistics over the past 25 years. They are not only able to address a broad audience, but also serve – with their attractiveness and exactitude – as a perfect basis for decisions in the democratic society. In a world overfled by new data streaming in every second, statistical atlases as trusted «travel guides through our society» will become even more indispensable in the future. They will continue to tell rich and diverse stories about the state, about individuals and their coexistence, which cannot be retrieved adequately from pure data tables.

Keywords. Atlases, Thematic mapping, Statistical mapping, Statistics, Classification, Bibliography, History of Thematic cartography

1. Introduction

Since 1818 statistical institutions have been issuing or supported the publication of meanwhile thousands of large thematic atlases that – often produced with the latest and most attractive technologies – portray important social and economic facts about countries, regions or cities. Especially during the last two decades of our information age, in which more statistical data have been provided and published by governments worldwide than ever before, the number of such atlas editions has increased dramatically. Currently, about 2500 statistical atlases can be found in printed or on-line bibliographies, one third of them already in digital form.

In spite of its acknowledged information value, usually large print runs and/or free availability as well as a general acceptance by the large public, the *Statistical Atlas* has almost never played a role in scientific studies and is lacking definitions and classifications in both disciplines – cartography and statistics – up until today.

The three main reasons causing this situation are:

1. Numerous important theoretical works on Thematic Cartography and Atlas Cartography appeared in the 1960 and 1970 – a period long after the first heyday of statistical atlases (1815-1915) and a time of only very few new issues, especially in after-war Europe.
2. Cartography as an upcoming science, which is proven by many authors, lost a certain interest in these simple, often trivial representations of numbers (and not geography), which seemed less a mapping issue than a statistical problem.

3. Statistical offices hindered a sustained market success by constantly changing the atlas titles from one to the next edition – often afraid of labeling them clearly as «statistical» products, as this term seemed to cause negative connotations by readers during many decades of the 20th century.

The objective of the thesis presented here was to closely analyze, by theoretical and empirical approaches, the character, the historical evolution and current role, as well future features and potentials of the «Statistical Atlas». Apart from closing scientific gaps, it was the author's intention to promote and increase the general awareness for this important atlas type, which it truly deserves as a very unique, unbiased and fact-loaded decision base for politicians and citizens alike.

2. Major findings and characteristics

2.1. A definition and classification for the Statistical Atlas

In the framework of the particular rules and regularities of public statistics, that strongly influence such atlases from the publisher's side, and also general classificatory features of atlases, four essential parameters could be identified, which single out this atlas from the existing plethora of works. These are: its contents, topicality, source and publisher. Based upon these parameters, a clarification of the term «Statistical Atlas» could be reached for the first time, followed by a general definition. A «*Statistical Atlas*» can thus be defined as an «*atlas, which in the form of an integral collection of mostly analytical maps and other information carriers (diagrams, tables, texts) graphically portrays current societal, and esp. socio-economic facts. In its true sense, it represents, by using primary sources and applying certain statistical methods, all spatial data gained by official statistics through special surveys or censuses for a broad societal insight.*»

Statistical atlases, which can be further divided into a) *polythematic statistical atlases*, b) *monothematic statistical atlases* and c) *provisional editions* (atlases combined with other contents), were dissociated from other atlas types, such as national, regional, planning or special-topic atlases. In its consequence and based upon these results, a new atlas classification in the shape of a structural scheme could be set up. Amongst other changes and major updates to previous schemes, often drawn in the 1970s and 1980s, it now comprises the «Statistical Atlas».



Figure 1. Map on foreign population, 2013 (Statistical Atlas of Switzerland).

2.2. Historical evolution and periods

In the context of this work, also a bibliography of statistical atlases with app. 800 titles could be established until last year. The list is currently being further extended by the author. Together with knowledge from the history of statistics and cartography, it helped essentially to explain the historical and societal background as well as motivations on the institutional side to publish such atlases at specific times. Clearly visible evolutionary lineages, peaks and turning points (periods of crises) in the genesis of statistical atlases allow for the identification of altogether eight historical periods over the last 200 years since the issuing of a statistical atlas around 1818. After the evolution and formation of statistical atlases as such, they saw their first heyday (as well as their mother discipline – statistics) by the end of the 19th and the beginning of the 20th century, followed by a longer decline and phase of weakness until the 1980s, which initiated, with the rise of modern technologies and digital, almost live production methods, a new «booming phase» for statistical atlases. This last period, characterized by numerous, almost daily new editions that are hard to keep track of including many new topics and representation methods. Fortunately, this process has not come to an end yet.

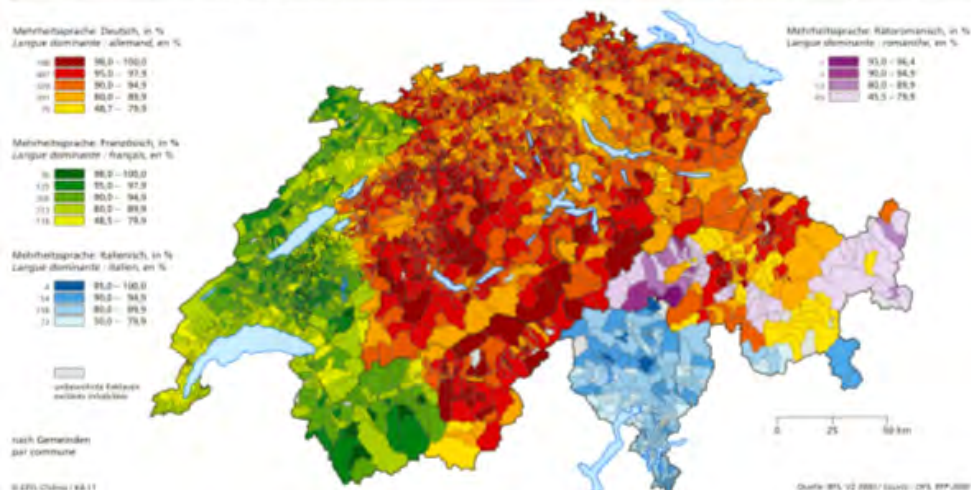


Figure 2. Map on linguistic areas, 2000 (Structural Atlas of Switzerland).

2.3. Conceptual aspects

Twenty statistical atlases with more than 6,500 individual maps were then representatively selected for a more detailed quantitative analysis regarding conceptual, formal, technical and communication aspects – and in order to find certain patterns and finally derive helpful rules for future issues. In respect of contents, a clear and unique worldwide system in the topical structure of all atlases could be discovered, to which changes occur over time, but almost never between any regions. In comparison with the overall content structures of public statistics it could be demonstrated, that in general only about half of all statistical topics from the offer of national institutes (14 out of 26) appear in such atlases. Reasons are mainly to be found in the data acquisition methods applied (data protection, choice of survey methods and the lack of a detailed spatial resolution in some data sets). Through their access to primary data, statistical atlases in general reach a degree of topicality unlike any other atlas type, which makes it so attractive for an information-hungry and data-obsessed audience as we know it today.

2.4. Formal aspects

Relative and absolute data in the form of simple key figures (98% share) dominate all statistical atlases. The ready availability of elementary analytical data in the public statistical domain strongly correlates to the cartographic representation methods applied. Three methods (same share of 98%) dominate statistical atlases: area cartograms, symbol cartograms and combinations of the two. Other cartographic methods – also so-called «statistical methods» (Imhof 1972) – remain at the margin and have only

experimental character in these atlases, independent of the regional or temporal context. Endless series of simple and self-explanatory choropleth maps in statistics, often being criticized by professional cartographic authors, thus deeply root in the underlying structure of public statistical data and less in the ignorance of other semiotic possibilities by the respective authors.

The choice and application of appropriate reference areas to statistical data have always been of crucial and timeless importance for the composition and quality of statistical maps. Therefore, the PhD thesis deals also exhaustively with these issues. For the first time, a structural scheme of the about twenty known and available area types was developed. It is a well-known and acknowledged fact, that administrative units are not much suited for comparative geographical analyses, due to their heterogeneous structure and size. However, in spite of the theoretical abundance of available reference areas, official statistics, due to their methods and their political mandate (coming from the administration), are generally unable to go beyond the representation of administrative boundaries and their aggregates. And it seems, they also don't need to do so, as most clients are exactly interested in these units. 96.2% of all statistical maps still refer to this area type.

2.5. Technical aspects

Statistical atlases usually apply the technological means and standards of their time. Nevertheless, in times when alternative market solutions for their current needs (topicality, automation, reduction of production costs) were lacking in cartography, statistics itself often stimulated the development of new methods, which eventually contributed to the enhancement and efficiency of thematic map production in general. This was the case in the early phase of thematic cartography during the 19th century, later on during the introduction of computer maps via automated production schemes from data bases in the 1970s and 1980s, and currently is in the field of semi-automated atlas platforms and Content Management Systems for a faster, durable and efficient map production. Technologies applied, backgrounds, motivations and long-term implications for all three periods were analyzed and evaluated in detail in the thesis.

2.6. Communication aspects

Public statistics and also statistical atlases find themselves in a very dynamic environment again. Interestingly, in the context of a fast and ever changing society and its unsteady demands, the topics in statistics and the representation methods applied for maps have remained almost unchanged over the past 150 years of their existence. However, in the aftermath of the quest for more topicality, quality, quantity and automation in the statistical production chain, which most customers (society and politics alike) embrace,

enormous technological changes in the dissemination processes are on the way. Only marginally recognized by many customers yet, a fundamental change in data acquisition methods in large statistical censuses is on the way in this very decade, for example in the population census which does now for the first time rely on data collected from registers and sample surveys only. This will lead to new challenges for graphical representations still waiting to be answered by scientists in the future. The thesis discusses and portrays some of the major trends and challenges, as well as the adaptation and role shift facing cartographers and statisticians in atlas production.

These positive influences and a strong need in our society for independent and trustful statistical data in a world of sheer data affluence evenly led the ground for a certain renaissance of official statistics itself, which changes also the reception of its name (statistics) amongst its citizens, who looked critically at everything «statistical» for a long period of time. Eventually, this impacts also the reputation of statistical atlases and their titles positively. More and more products of the last two decades carry the name «Statistical Atlas» again in their titles – instead of various unrefracting synonyms. Statistical atlases are nowadays being absorbed and consulted by an extraordinarily diverse and broad audience, which comprises almost all societal and professional levels (which is rare for any other atlas type). The majority (84%) of users come from a professional background (education, media, politics, science), but the share of pure private users, consuming statistical atlases is constantly increasing.

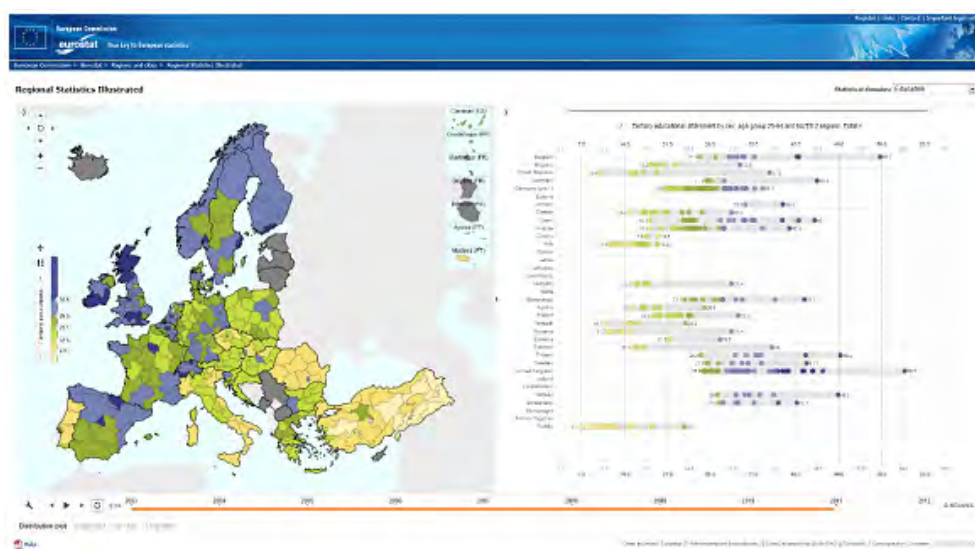


Figure 3. Map on tertiary education, 2011 (Eurostat).

3. The relevance of statistical atlases for the society

Maps and graphs, with their unique semiotic potential – the graphical language, can easily translate huge amounts of data into concise images showing various distributions or developments in our society and economy over space and time. By doing so, they immediately create an excellent overview and bring things to the point, as it is so much required in our fast-moving information society of today. With the rise of digital media, especially images have become omnipresent. They increasingly take over the dominant role of words and text in former times. Simple and easy-to-consume media maps and infographics are extremely popular and one of the fastest growing branches of cartography and the graphical industry in general. It is in this very field, in which public statistics more and more step up as an important map producer as well as global information player. Atlas cartography has a special status in the world of cartography. Its products – atlases – belong to the most well known cartographic products (one could also refer to them as the «crown of cartography») and accompany the modern human being as comprehensive spatial encyclopedias from as early as the school age throughout its whole life.

Statistics as a science and organization uses atlases in large quantity, either to present a deeper insight into one of her special topics (politics, population, health, economy, agriculture, environment etc.) or simply offer a visual overview of the most important statistical results of a country, region or city. Public statistics and thematic cartography today have a common concern and join forces through «story-telling» in atlases. Story-telling – the making of fascinating and thrilling histories by using all sensory channels (text, image, graph, audio, video) with the objective to captivate as many customers as possible with a theme and giving them access to further data for their decisions – is a basic interest of the statistical dissemination process. And yet another fact enables atlases to act as special ambassadors for the communication of important figures which have been collected by the administration. In contrast to all other forms of publication (yearbooks, pocket statistics, reports, tables, data bases etc.), only atlases allow for the addressing of all three statistical dimensions at the same time: topic – time – and space: the great *What? – When? – Where?* of statistics.

4. Conclusion: Practical implications of this research

There are two very practical implications to be drawn from the thesis presented here. On the basis of the newly developed atlas classification and the accompanying classification parameters, statistical atlas, for the first time, can be classified and registered correctly and accordingly to their atlas type characteristics in bibliographies, libraries and atlas collections. This solves a fundamental structural problem existing in almost all collections. Lacking clear order criteria, statistical atlases are today usually distributed over the entire stock in libraries and map collections, sometimes classified by thematic, formal or chronological aspects. But usually, they cannot be found together as one collection for the interested scientist or atlas collector.

In a larger context, and even more important for today's and tomorrow's society, the detailed insights into current atlas content systematics, data types and data management procedures, specific representation methods, technical solutions and reference areas, will be of great use for future producers of statistical atlases. On the one hand, they can be used, in a strategic sense, to justify and better explain new atlas projects and their objectives at statistical institutions and universities and help to better differentiate them from other atlas projects and atlas types. On the other hand, they can directly be of use as manuals, as ready-to-copy samples for the production of a new and successful atlas of this kind. All necessary components for the construction of statistical atlases – independent of any specific media format – are being described in the author's publication.

Finally, in the scope of the evolution of the modern information society and new technologies such as Web 2.0 and 3.0, the reception and acceptance of official statistical publications depend again largely on a good presentation of their contents, especially also by means of visual information content. Thus, maps for the last two decades have experienced a true and welcomed revival in statistics. They are able to easily address a broad user audience from all professions and classes in society. Especially statistical atlases will face an exciting time in the years to come, which they will also master with innovations as they have done during the past 30 years. In a society overwhelmed with new data streaming in every second, statistical atlases as trusted «travel guides through our society» will become even more indispensable in the future. They will continue to tell rich and diverse stories about the state in general, about individuals and their coexistence in our modern society, which can not be retrieved adequately only from tables and texts.

References

- Arnberger E (1977) Thematische Kartographie. Westermann, Braunschweig
- Asche H (2007) Stand und Zukunftstendenzen der Atlaskartographie im Spiegel digitaler Atlanten. In: Kartogr. Nachrichten. 57(4):183–91
- Bertin J (1967) Sémiologie graphique: les diagrammes – les réseaux – les cartes. Paris
- Bollmann J, Koch WG (Eds., 2001) Lexikon der Kartographie und Geomatik. Spektrum, Heidelberg, Berlin
- Dickinson GC (1963) Statistical mapping and the presentation of statistics. Arnold, London
- Dickmann F, Zehner K (2001) Computerkartographie und GIS, 2nd edn. Westermann, Braunschweig
- Funkhouser HG (1938) Historical development of the graphical representation of statistical data. In: G. Sarton, p 269–404
- Grohmann H (1992) Zur gesellschaftlichen Funktion der amtlichen Statistik und deren aktuellen Herausforderungen. In: Metzler-Poeschel (Eds.), p 3–31
- Hake G, Grünreich D, Meng L (2002) Kartographie. 8th edn. De Gruyter, Berlin & New York
- Imhof E (1972) Thematische Kartographie. De Gruyter, Berlin
- MacEachran AM, Fraser Taylor DR (Eds., 1994) Visualization in Modern Cartography. Oxford, New York, Tokyo
- Nag P (1984) Census Mapping Survey. Concept Publishing, New Delhi
- Ormeling F (2009) Moderne Atlaskartographie im Spiegel von National- und Regionalatlanten – Bestandsaufnahme und Entwicklungslinien. In: Kartogr. Nachrichten. 59(1):13–18
- Schulz T (2009) Maps. In: UN-ECE (Ed.) Making Data Meaningful. A guide to presenting statistics. New York, Geneva, p 30–40
- Schulz T (2012) The Statistical Atlases of Switzerland and their Atlas CMS. In: Jobst M (ed.) Service-Oriented Mapping 2012, Vienna, p 453–469
- Schulz T (2013) The Statistical Atlas. Studies on classificatory, conceptual, formal, technical and communication aspects. Technical University of Dresden, Dresden
- Schulz T, Ullrich T (2009) Ein Atlas Content Management System für den neuen Statistischen Atlas der Schweiz. In: Kartogr. Nachrichten. 59(1):25–36
- Slocum, TA (1999) Thematic Cartography and Visualization. Upper Saddle River, New Jersey

Mapping indigenous peoples from Central Brazil between 1700-1900 AD – A contribution to Nimuendaju's Ethno-Historical Map using IBGE's Database and other sources

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Abstract. This paper locates indigenous peoples who dwelt the Brazilian Central Plateau and surrounding areas during the 17th, 18th, and 19th centuries. It has used as main source the Curt Nimuendaju's ethno-historical map, made in 1944 and first published by IBGE (Brazilian Institute of Geography and Statics) in 1981. As another source of information it has used the Čestmír Loukotka's ethno-linguistic map, published by the Association of American Geographers in 1967. Furthermore, this research also carried out an unprecedented mapping of the location of ethnic groups, as well as the first Luso-Brazilian villages, using the municipal historical descriptions within *IBGE Cidades* database. It is illustrated through temporal maps the successive occupations (and depopulation) of indigenous peoples in their territories at intervals of 50 to 50 years, since the year 1700 AD until the year 1900 AD. The conclusions are that there were at least 200 ethnic groups in the Brazilian Central Highlands and surrounding areas.

Keywords. Central Brazil, Ethno-Geography, Ethno-Cartography, Ethno-history

1. Introduction

The first relevant study concerned on mapping the location of indigenous peoples in Brazil is due to the German naturalist Carl Martius (1867a¹). Said

1

The present paper uses two references of Carl Martius, both published in 1867, thereby identified as "a" and "b". See *Reference* section for more details.

author has grouped all Brazilian indigenous language families that had news. It was the first time used the term *Gê* to be named the language family now called in Brazil *Jê*. His choice was based on the fact that most of the people speaking the languages of this family use the term *Gê* to call themselves, e.g. *Apinagez* and *Crangez* (Senna 1908: 14), among others as *Kempokatagê*, *Piocobjê*, *Kemkatejê*, *Kanakatejê* and *Krengesz* (Santos 2013).

The *Gê* language family covers most people who live (and lived) in the Brazilian savannas in the states of *Goiás*, *Minas Gerais*, *Bahia*, *Maranhão* and *Piauí*, called in this article as *Gerais* of Brazilian Central Plateau at the time of the Luso-Brazilian invasions. In addition to them, some *Tupi*, *Kariri*, *Pimenteira* among others, were also within in this area somehow (Santos 2013).

This paper will seek to present through maps and tables the multi-ethnicity which existed in the Brazilian Central Highlands and surrounding areas. In order to achieve this, information from ethno cartography made by Curt Nimuendaju (2002 [1944]) and Certmir Loukotka (1967) was collected. Historical maps produced during the 18th and 19th centuries, archived in libraries in Portugal and Brazil were also used. Besides, historical data extracted from *IBGE Cidades* (IBGE, 2012) were used to increase information that have never been mapped before.

2. Mapping indigenous peoples from the Brazilian Central Plateau

The Ethno-historical Map of Brazil and Adjoining Regions crafted by the German-Brazilian ethnographer Curt Nimuendaju (2002 [1944]) brings together all the aforementioned and cataloged ethnic groups by Martius (1867b²) and adds others. In the Brazilian Central Plateau, Nimuendaju's map indicates 108 ethnic groups of 13 known families. Furthermore, it registers either groups whose languages are not grouped in families or are unknown.

It features three dominant peoples in the *Gerais* of Central Plateau: in the area called *Espigão Mestre* points presence of *Xakriabá* and *Akroá*, of *Gê* family; and the *Aricobé*, of *Tupi* family. The presence of *Tupinambá* is also recorded - a group of coastal people. Further south, he finds the *Xakriabá* in *Urucúia* highland and the *Urucúia-Paracatu* valley; in the Brasília highland, he traces the *Cayapó* people in the extreme southwest of this physiography.

² See footnote 1

The Map of South American Ethno-Linguistic Distribution prepared by the Czech linguist Čestmír Loukotka (1967) presents a wider range of ethnic groups in the Central Brazilian area, compared to Nimuendaju's map. Loukotka mapped 144 peoples of eleven known families in the Central Plateau region, beyond those not grouped in families or those where no linguistic information available. Eleven ethnic groups presented in this map are in *Espigão Mestre*, seven from *Gê's* family (*Crixá, Kururu, Acroa, Chicriabá, Tapacuá, Cherente* and *Aricobé*), two from *Tupí's* family (*Amoipira* and *Tupí*) and a group from *Carirí's* family. As it is noted, Loukotka ranks *Aricobé* people as *Gê*, and not *Tupí* as Nimuendaju did. Yet it identifies as *Tupí* what Nimuendaju spelled as *Tupinambá*. This map also presents the ethnic group *Gaíba* and *Anicum* within surrounds, the first group from *Gê's* family and the last one as an unidentified family. Moreover, the historiography of the municipalities, available on *IBGE Cidades* database (IBGE, 2012), have further information about evidence from other ethnic groups in this region. It shows 68 ethnic groups living in the Central Highlands during the eighteenth and nineteenth centuries, whose belonging to eight known language families, besides those whose available information were insufficient to make a linguistic classification. It uncovers four ethnic groups of the *Gê* family (*Caiapó, Xakriabá, Akroá* and *Gaíba*) living in *Espigão Mestre* region; one people of the *Tupí* family (*Tupiniquim*); another group (*Pimenteira*) whose linguistic family is disputed between *Borun* or *Karib*; three with non identified family (*Assú, Jamela* and *Vermelho*) and another called only *Índios* (in historical context) therefore these have no ethnic definition.

The table in Appendix 1 presents the compilation of these ethnic groups quoted in the paragraphs above.

Santos (2013) was the first to map the ethnicities within *IBGE Cidades* database. His research also has compiled the dates when the villages were founded, their elevation as districts, and their emancipation as municipalities. Therefore, it enables an approximate evolutionary framework of Luso-Brazilian colonization in the region, as shown on the maps in Appendix 2 of this paper.

According to the research mentioned above, historical maps confirm the presence of some ethnic groups located either in IBGE (2012) or in those ethnographic maps. The historical maps consulted were:

- "*Mapa da Capitaniá de Goyáz*" (or bishopric map), around 1750, at Public Library of Évora (Portugal);
- "*Mapa Geral de Toda Capitania de Vila Boa de Goiás*", 1820, at Geographical Society of Lisbon;
- "*Carta geográfica da capitania de Minas Geraes*", 1804, at Infrastructure Direction of Portuguese Army;

- "*Carta da Capitania de Pernambuco*", around 1800, National Library in Rio de Janeiro;
- "*Carta da capitania de Goyáz, elaborado por Francesco Tosi Colombina*", 1751, Overseas Historical Archive in Lisbon.

In *Figure 1*, all the mentioned compilations can be seen, using Nimuendaju's map as a background. It can be seen that most of the gaps in Nimuendaju's map (*left*) could be supplemented by other sources (*right*).

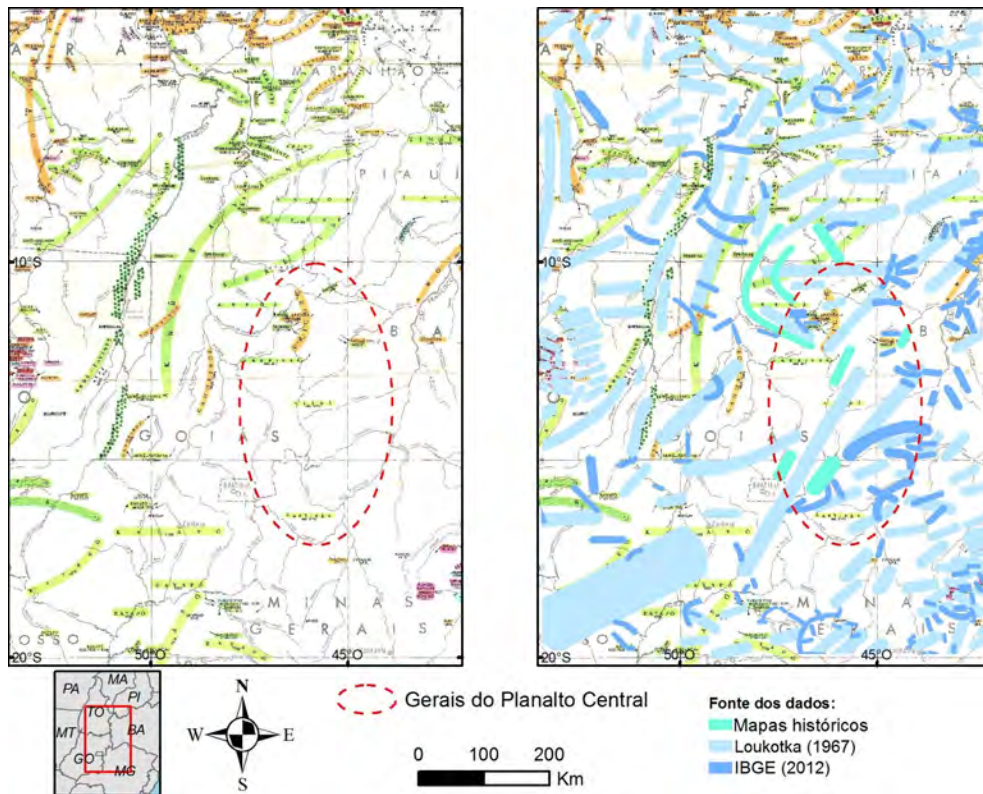


Figure 1. Compilation of ethnic groups in the Brazilian Central Highlands and surrounding areas, especially in the *Gerais*. On the left, a clipping of Nimuendaju's map (2002 [1944]); on the right side, an overlap with other sources.

Focusing on the area of the *Gerais* in the Brazilian Central Plateau, *Figure 2* shows all the ethnic groups mentioned in the sources discussed above, grouped into linguistic families. Analyzing together the *Figures 1 and 2* with a support of the table in Appendix 1, it is noted that: beyond the four ethnic groups mentioned in Nimuendaju's map (*Šakriabá*, *Akroá*, *Aricobé* and *Tupinambá*), there are seven that were informed by Loukotka (*Amoipira*, *Cariri*, *Cherente*, *Crixá*, *Kururu*, *Tapacuí* and *Anicum*). In addition, seven other ethnic groups were extracted from IBGE *Cidades* database (*Caiapó*, *Guaíba*, *Tupiniquim*, *Pimenteira*, *Assu*, *Jamela* and *Vermelho*).

Thus, fourteen more ethnic groups beyond the four cited by Nimuendaju, totaling eighteen ethnic groups in the *Gerais* area.

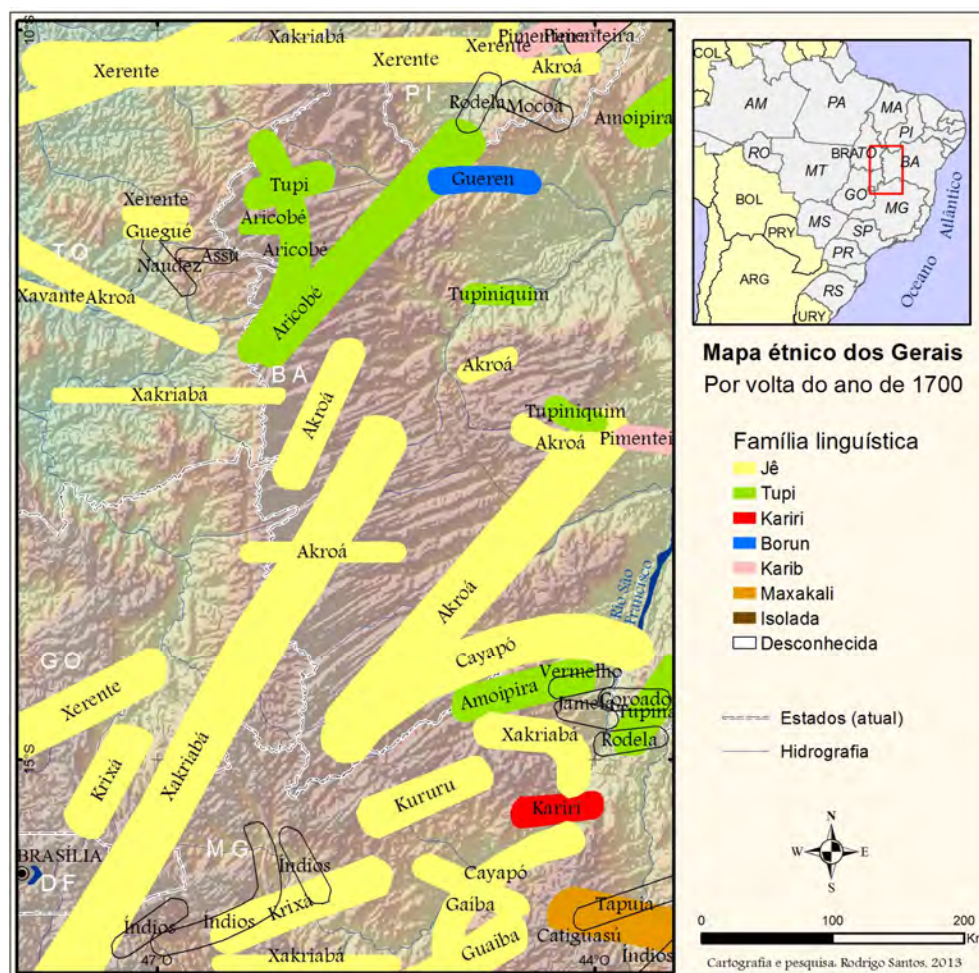


Figure 2. Location of indigenous ethnic groups in the *Gerais*, part of Brazilian Central Plateau - by the year 1700 AD. Cartography: Rodrigo Santos. Source: Nimuendaju (2002 [1944]), Loukotka (1967), and IBGE (2012).

Figure 3 shows a sequence of maps that represent different moments of indigenous peoples occupation in *Gerais* area, from 1750 AD to 1900 AD. For information about the year 1700 AD take a look at *Figure 2*.

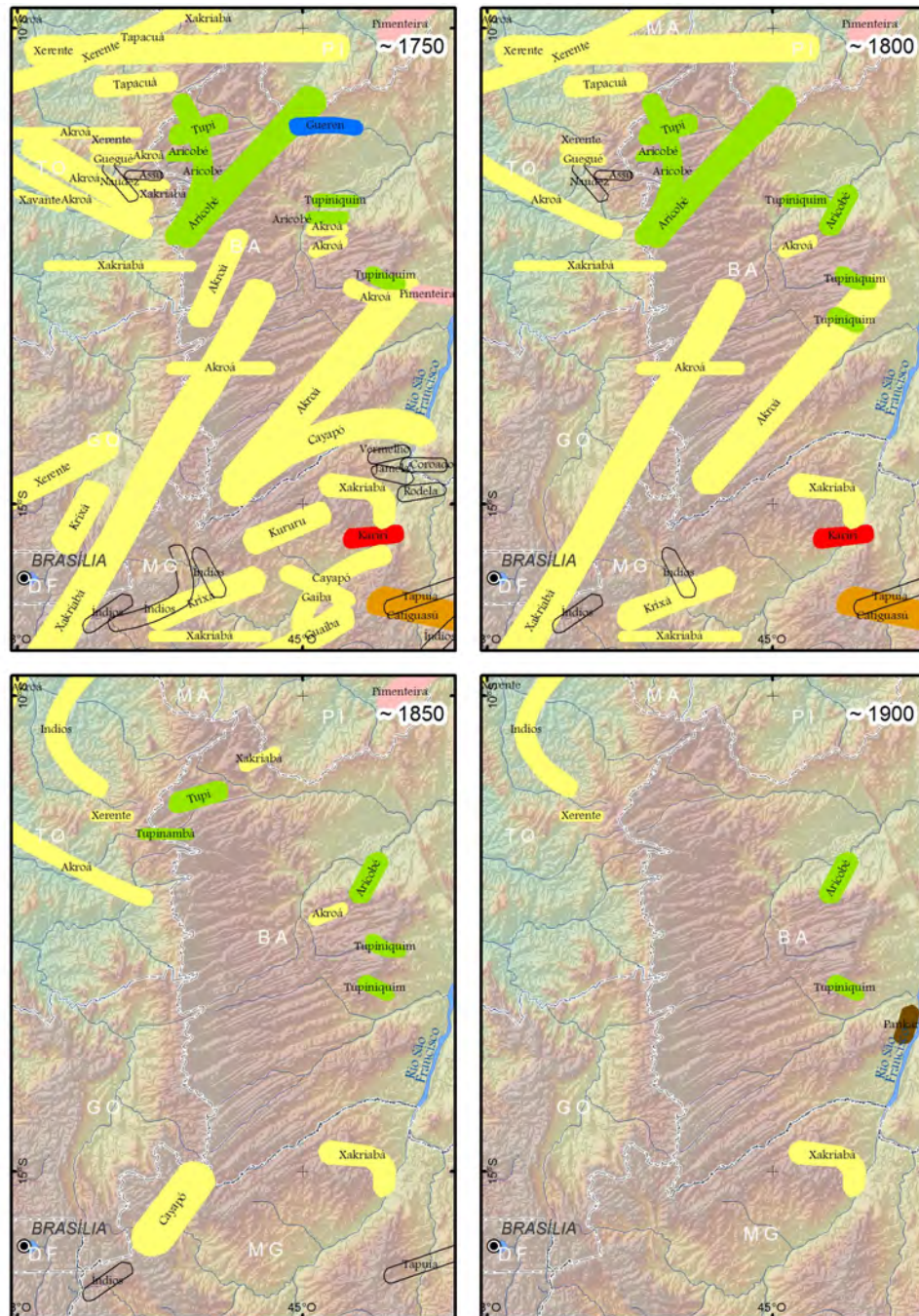


Figure 3. Dynamics of indigenous peoples occupation in the *Gerais* area after the Luso-Brazilian invasions.

The passage from 1700 AD to 1750 AD shows peoples gathering on the northwest corner of the *Gerais*, site of two villages founded by the Portuguese Crown, *Formiga* and *Duro*. Also note the disappearance of *Tupi* peoples from the shores of *São Francisco* river, where, nowadays, lies the west side of the border between *Bahia* and *Minas Gerais* states. Just before that, during the late seventeenth century, this site had been invaded by *São Paulo's* pioneers and *Bahia's* cowboys cause of the vanishing of other native groups until the end of the eighteenth century (Santos 2013).

In addition, the southern of *Piauí* was also depopulated in the eighteenth century. It is the same place where several cattle farms were erected from *Bahia* since the late seventeenth century. In the south of *Gerais*, the major impact has occurred during the late eighteenth to the early nineteenth centuries. Several ethnic groups disappeared from the map. The *Cayapó* left the shores of *São Francisco* and moved towards the highlands.

The *Akroá* retreated to the north, and *Xakriabá* were divided, one part remained in the south and the other in the north. The southern probably mixed with many indigenous peoples from other ethnic groups, such as *Cayapó*, *Jamela*, *Guaiba* and others, forming the current *Xakriabá*. The whereabouts of those who went north are still unknown as is that of the *Akroá* (*ibid.*).

The *Timbira* left the southern *Piauí* and entered the southern *Maranhão* and northern *Goiás* (actual northern *Tocantins*), this where the *Akroá* were living. It is likely that current *Timbira* have either received some *Akroá* people in their communities, or fought with, expelling them from there (*ibid.*).

Further noting Figure 3 is clear the reduction of *Aricobé* in the mission that received their name, next to a river named *Rio Grande*, especially since the eighteenth century. It is also interesting to note the arrival of the *Tupinambá* at the *Serra Geral* ridge, probably fleeing from the *São Francisco* river. Analyzing maps with broader scale in the Appendix 2, it turns out that the *Tupinambá* have emerged elsewhere in the upper *São Francisco* as well, as an aftermath of the escape from the coast (*ibid.*).

For the same reason is the arrival of *Pankaré* at the shores of *São Francisco* river during the end of the nineteenth and early twentieth centuries. They were following the same path of hundreds of Northeastern Brazilian migrants fleeing a drought.

Yet analyzing the maps in Appendix 2, there is the huge country *Gê*, located in Central Brazil that was being invaded from the east and the south by Luso-Brazilian settlers. It pushes *Gê* community to the north and west, forcing them to invade the Amazon jungle and the forests of *Maranhão*, eliminating or expelling groups that were previously living there (*ibid.*).

Therefore, much of the *Gê* we know today are *Kayapó* and *Timbira*, because they were closer to the borders west and north of *Gê* country. Other tribes, such as the Southern *Caypó*, *Akwen* and *Akroá*, suffered from greater losses. They were massacred and reduced in numbers. Promoting what Chiquinha Paresi calls "the wall" in front of Luso-Brazilian expansion (Angelo 2013).

The *Xavante*, for example, was one of the groups that managed to remain isolated for many centuries. Due to the contacts they had received in the early eighteenth century, many of them were imprisoned, part of the group managed to remain free, roaming towards the fragments of savannas that had not been invaded by Luso-Brazilians yet. Until they could cross the river *Araguaia*, in the course of the nineteenth century, and secure themselves over the river *Manso*, now known as river *Das Mortes*, in *Mato Grosso* state. They ended up making peace with the Luso-Brazilian attackers during the mid-twentieth century.

The occurrence of multi-linguistic nuclei can be noticed on these maps in some areas, such as: the upper *Xingu* region; in the east of *Minas Gerais*; in the region between the *Grajaú* and *Parnaíba* rivers (*Piauí* and *Maranhão* states); and in the middle of *São Francisco* river area. Observing the map of Loukotka (1967), other multi-language regions occurred in the country as between *Pernambuco*, *Ceará*, *Paraíba* and *Rio Grande do Norte* states, among others. From this diversity only the *Xingu* survived until the year 1900 AD.

3. Conclusion

This paper sought to present through maps and tables the multi-ethnicity which existed in the Brazilian Central Highlands and surrounding areas. In total 200 groups were identified living within the region, of whom 112 were already contained on the Nimuendaju's map. Among the 88 added, 61 were identified on the Loukotka's map, while 22 were identified from the *IBGE Cidades* database, and five were found in both sources.

This research identified 509 places where these ethnic groups were located, in which 208 were already shown on Nimuendaju's map. The other 301 sites were extracted as follows: 154 from Loukotka's map, 139 from *IBGE Cidades* database and eight taken from historical maps (archived in Portuguese and Brazilian libraries, such as *Conselho Nacional Ultramarino* and *Sociedade Geográfica* in Lisbon, *Biblioteca Pública* in Évora-Portugal, and *Biblioteca Nacional* in Rio de Janeiro).

This information about sites and ethnic groups has been showed on the five attached maps in Appendix 2.

Currently, few indigenous peoples from *Cerrado* biome (Brazilian Savanna) are trapped in small native biome fragments that still remain. With the advance of monoculture (soy, eucalyptus and cattle) over these areas they will certainly disappear, and with them a knowledge that originates from over 10 000 years ago in this portion of the world. To avoid this, it is necessary conclude strategies to rescue and enhance the cultural and natural heritage of the *Cerrado* biome, creating protected areas and fostering projects of ethno-environmental recovery, including, therein, indigenous peoples both as sources of information and as agents in this conservation.

The education of our society is fundamental to reverse this process. It is necessary that our children know the past focused on the territory of their current addresses. People suffered and lost their lives and territory to make the society possible which now uses it. The past is part of the humanity's identity. The errors were ours and therefore we have to correct them.

References

- Angelo FNP (2013) [thesis examiner] Master in Sustainability along indigenous peoples and their territories, Sustainable Development Centre, University of Brasília. Examiners of the thesis. Brasília: 08 Feb. 2013.
- IBGE - Instituto Brasileiro de Geografia e Estatística (2012) Cidades: História. IBGE, Rio de Janeiro. <http://ibge.gov.br/cidadesat/topwindow.htm?1>. Accessed 21 September 2012.
- Loukotka, C (1967) Ethno-Linguistic Distribution of South American Indians. Annals of The Association of American Geographers, vol. 57, n° 2, June, map supplement n° 8. Joseph E. Spencer & Norman J. W. Thrower (eds.). 1 map, color, scale 1:8 500 000. AAG, Washington-DC.
- Martius CFP (1867a) Die Ehemalige Verbreitung und die Muthmasslichen Wanderungen der Tupis: Die jetzigen Haupt-Sprachengruppen. 1 map, color. Leipzig. http://www.archive.org/download/martius_mapa/Martius.jpg>. Accessed 02 June 2016
- _____. (1867b) Beiträge zur Ethnographie und Sprachenkunde Amerika's zumal Brasiliens: I. Zur Ethnographie. Leipzig: Friedrich Fleischer. http://www.archive.org/download/martius_v1/martius_1867_beitrage_v1.pdf . Accessed 20 June 2016.
- Nimuendaju C U (2002) Mapa Etno-histórico do Brasil e Regiões Adjacentes. Mapa etno-histórico de Curt Nimuendaju. Fac-similar edition, [pullout]. 1 map, color, 79 cm x 95 cm. Scale 1:5,000,000. IBGE, Rio de Janeiro; Brasília, MEC. (Done in 1944 and first published in 1981) http://biblio.etnolinguistica.org/local--files/nimuendaju-1981-mapa/nimuendaju_1981_mapa.jpg. Accessed 02 June 2016.
- Santos RM (2013) O Gê dos Gerais - elementos de cartografia para a etno-história e etnolinguística do Planalto Central: contribuição à antropogeografia do Cerrado. Master Thesis in Sustainable Development. Sustainable Development Centre of University of Brasília. <http://repositorio.unb.br/handle/10482/13288> and <http://popygua.blogspot.ie/2013/03/ogedosgerais.html>. Accessed 02 June 2016.
- Senna NC (1908) Os Índios do Brasil: Distribuição geográfica dos índios do Brasil - sua etnogenia. Memória do 3.º Congresso Científico Latino-Americano no Rio de Janeiro de 1905. Imprensa Official do Estado de Minas Geraes, Belo Horizonte.

Appendix 1. List of ethnic groups in the Brazilian Central Highlands and surrounding areas (between the years 1700-1900 AD) and correlating nomenclatures in the respective sources. Org. Rodrigo Santos, 2013.

Nimuendaju	Lpoukotka	ÍBGE
Abaeté	Abaeté	Abaeté
Akroá	Akroá	Akroá
Amanayé		Amanajó
Amoipira	Amoipira	Amoipira
	Ampanea	
	Anambé	
Anicum	Anicum	
	Anta	
Apányekra		
Apinayé	Apinajé	Apinajé
	Aponegicran	
	Aracajó	
Araé	Arae	
Aranã	Aranaa	Aranã
Aranhi	Aranhi	
Arara	Arara	
	Arasuaí	
Arawine	Arawine	
Araxá	Araxó	Araxá
	Araxué	
Aricobé	Aricobé	
Arua	Aruan	
Arupay		
Assuriní	Asurini	
		Assó
	Aueiko	
Auetí	Auetí	
	Augutjé	
Barbados		Barbado
	Batum	
	Bonitó	
Boróro	Boróro	Boróro

Nimuendaju	Lpoukotka	ÍBGE
		Botacudo
Buritiguara		
	Caeté	
Cakamekra		
		Caingangue
		Canela
Canoeiro	Canoeiro	Canoeiro
	Capiecran	
Carambu		
	Caraho	
	Carijó	
Cataguá		Cataguá
	Catiguasó	
	Catolé	
Cayapó	Cayapó	Cayapó
		Centossé
		Coroado
Coroata		
		Coropó
	Cradaho	
Crixá	Krixá	Crixá
	Cumanaxo	
	Custenau	
	Dendi	
Dyore	Djore	
	Dokoro	
	Duri	
	Erema	
Etwét	Etwet	
Gamela	Gamela	Gamela
	Goaia	
Gaviões		

Nimuendaju	Lpoukotka	ÍBGE
		Golache
Gorotire	Gorotiré	Gorotira
Goyá	Goyá	Goyá
	Guaiaba	Garba
Guajá	Guajá	
Guajajara	Guajajára	Guajajara
Guanaré	Guanare	
Guanhão		Guanhão
Guapindaye		
		Guarani
Guarino	Guarino	
Guegué	Guegué	Guegué
		Gueren
	Ímaré	
Írã-amráire	Íraamráire	
Jacunda		
Jaicó	Jeicó	
Jauari	Jauari	
		Jamela
Javaé	Javaé	Javaé
Jundiahý		
Juruna		
Kalapalu	Kalapalu	
Kamayurá	Kamayurá	
	Kanindé	Canindé
Kapairé		
Kaposó	Kapoxo	
Karayá	Carajá	Karajá
	Kariri	Cariri
Karakateye	Caracatajé	
Kayapó	Kayapó	Kaiapó
Kenkateye	Crencatajé	
Kenpokateyé	Kenpokatajé	
Krahè		Krahè
Krahô	Craho	
Krepumkateye	Creapimcatajé	
Kreyé	Crejé	
Krikati	Krikati	

Nimuendaju	Lpoukotka	ÍBGE
Kruatire	Cruatire	
Kube-krã-kegn		
Kube-krã-noti		
Kuikuro	Kuikuro	
Kukoekamekra		
Kupe-rop		
	Kururu	
	Macamecran	
	Maconi	
Mahinaku		
Mákamekra		
Makoní		
Malali	Malali	
	Manayé	
	Mangaló	
	Manisauá	
Mapaxó	Mapoxo	
		Maracajá
		Masakará
Masakari		
	Meitajé	
	Mek-kran-noty	
	Metotire	
	Minhana	
		Mocoá
Monosó	Monoxo	
	Nacnanuc	
	Nacrehe	
Nahukuá	Nahuquá	
Naravute	Naravute	
		Naudez
Nyurukwaye	Norocujé	
	Onoyoro	
	Orari	
	Panariá	Panariá
Panyame	Panhame	
		Pankaré

Nimuendaju	Lpoukotka	ÍBGE
	Paracana	
Paraxim	Paraxim	
Paresí		
	Pariri	
	Patacho	
		Pilão
Pimenteiras	Pimenteira	Pimenteira
	Piocobje	Piocobjé
	Piripiri	
Pörekamekra	Purecamecran	
Pobzé	Purucarú	Pobzé
		Pontá
Pukópye		
Purí		Purí
Purukarod		
Puty	Puti	
Ramkó-kamekra	Remkokamekran	
		Rodela
	Sacamecran	
Suyá	Suyá	
	Tacanapé	
Tacarijó	Tacarijó	Tacarijó
Tacayuna	Tacayuna	
Takonyapé		
	Tajé	
Tamoyo	Tamoyo	
Tapacuá	Tapacuá	
Tapirapé	Tapirapé	
Tapiraua	Tapirauha	
Tembé		
	Tavóri	

Nimuendaju	Lpoukotka	ÍBGE
Teremembé	Teremembé	Teremembé
Timbira	Timbira	Timbira
Timirém	Timirem	
	Tobajara	
	Tocoió	
Trumai	Trumai	
Tsuva		
	Tupi	Tupi
Tupiná	Tupina	Tupinaé
Tupinambá		
		Tupiniquim
	Ushicrin	
	Uti	
		Urucé
	Vanhereri	
		Vermelho
	Vocoin	
	Waurá	
Sakriabá	Chikriabá	Xakriabá
Xambioá	Xambioa	Xambioá
Aken-Savante	Chavante	Xavante
Serente	Xerente	Xerente
	Xicri	
Xipayá		
	Xonin	
Yarumá	Yaruma	
Yawarapiti	Yaulapíti	
	Yuruna	
	Zumplan	

Appendix 2. Brazil's Central Plateau ethno-linguistic maps

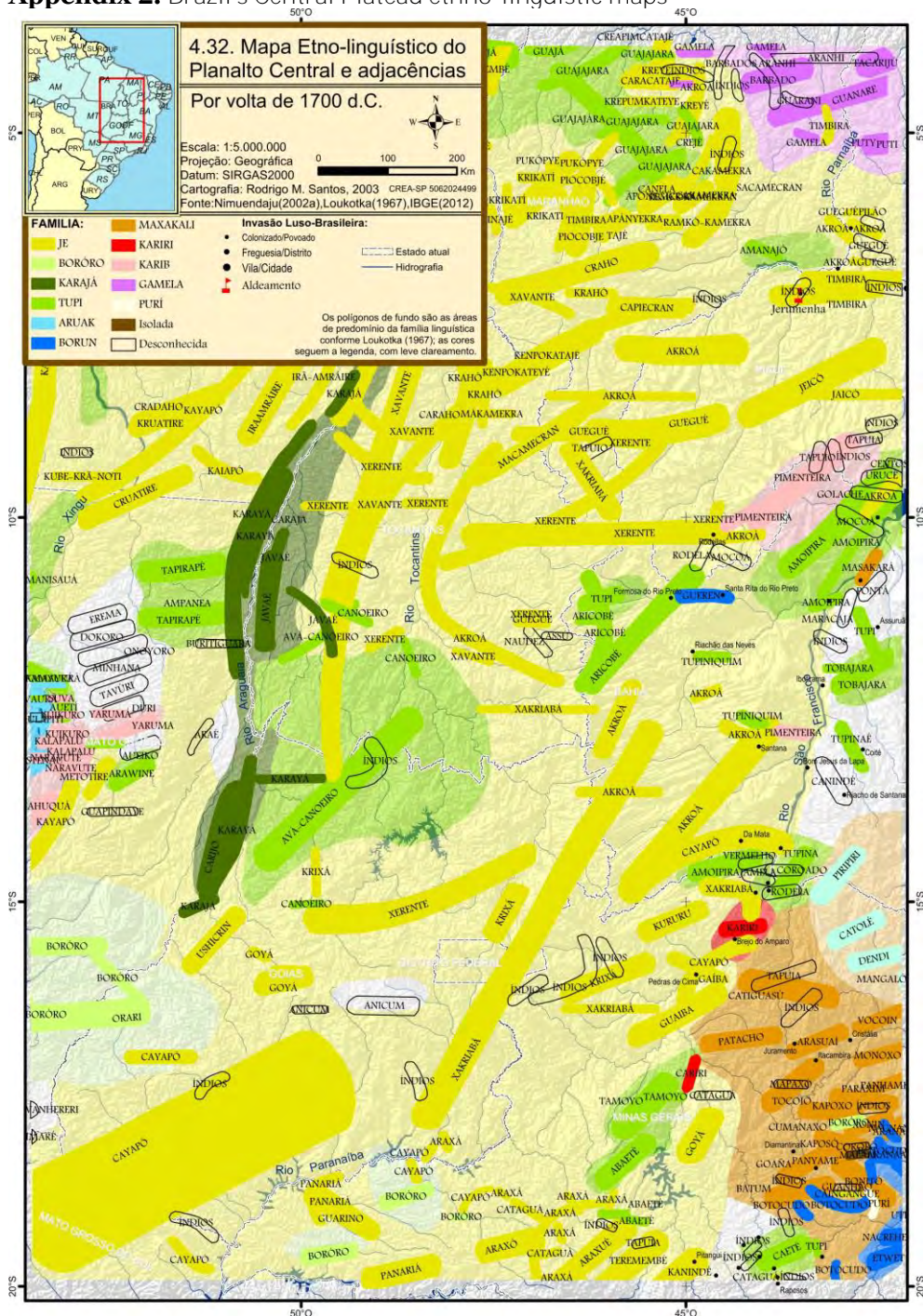


Figure 4. Brazil's Central Plateau ethno-linguistic map, circa 1700 AD.

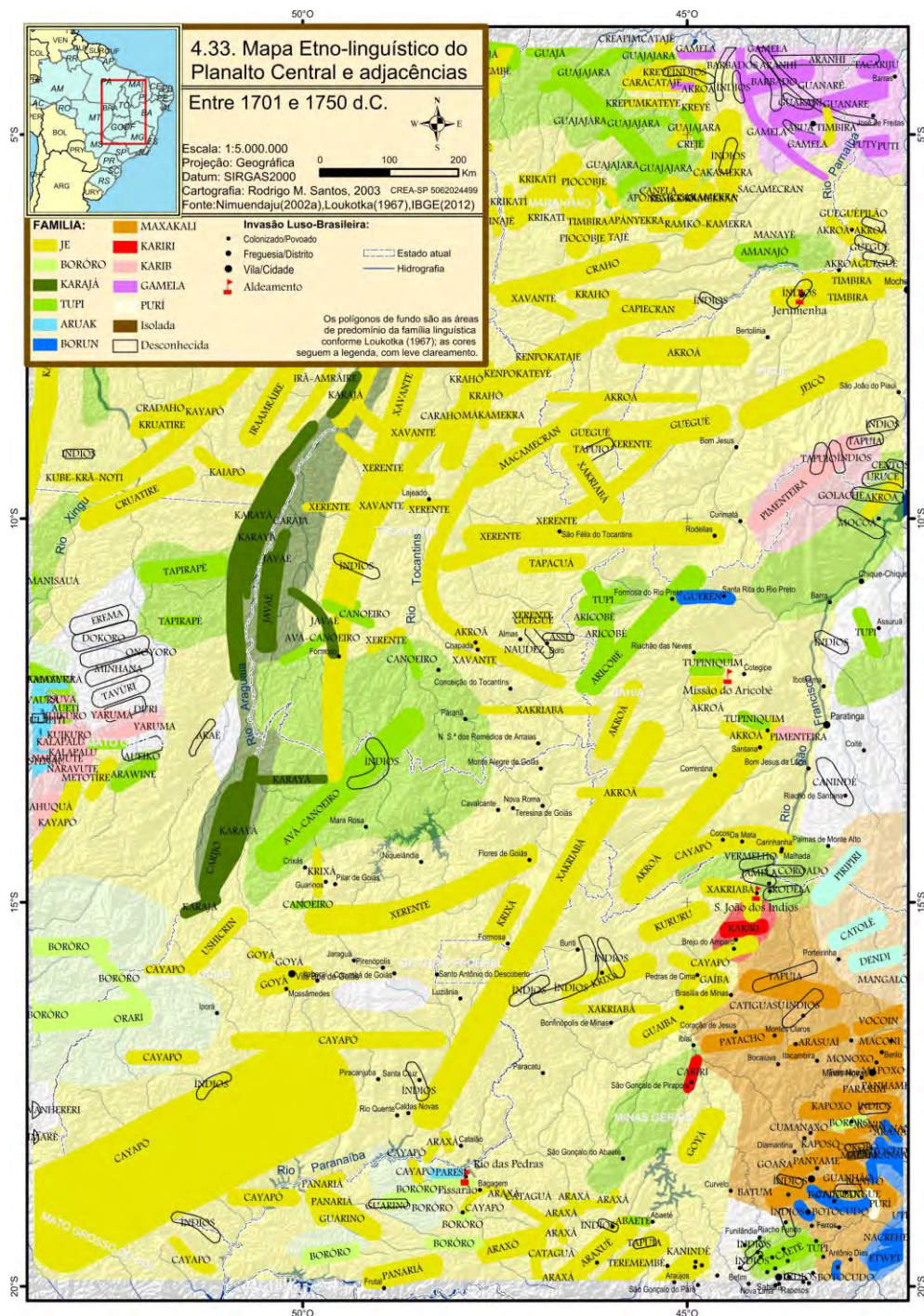


Figure 5. Brazil's Central Plateau ethno-linguistic map, between 1701-1750 AD.

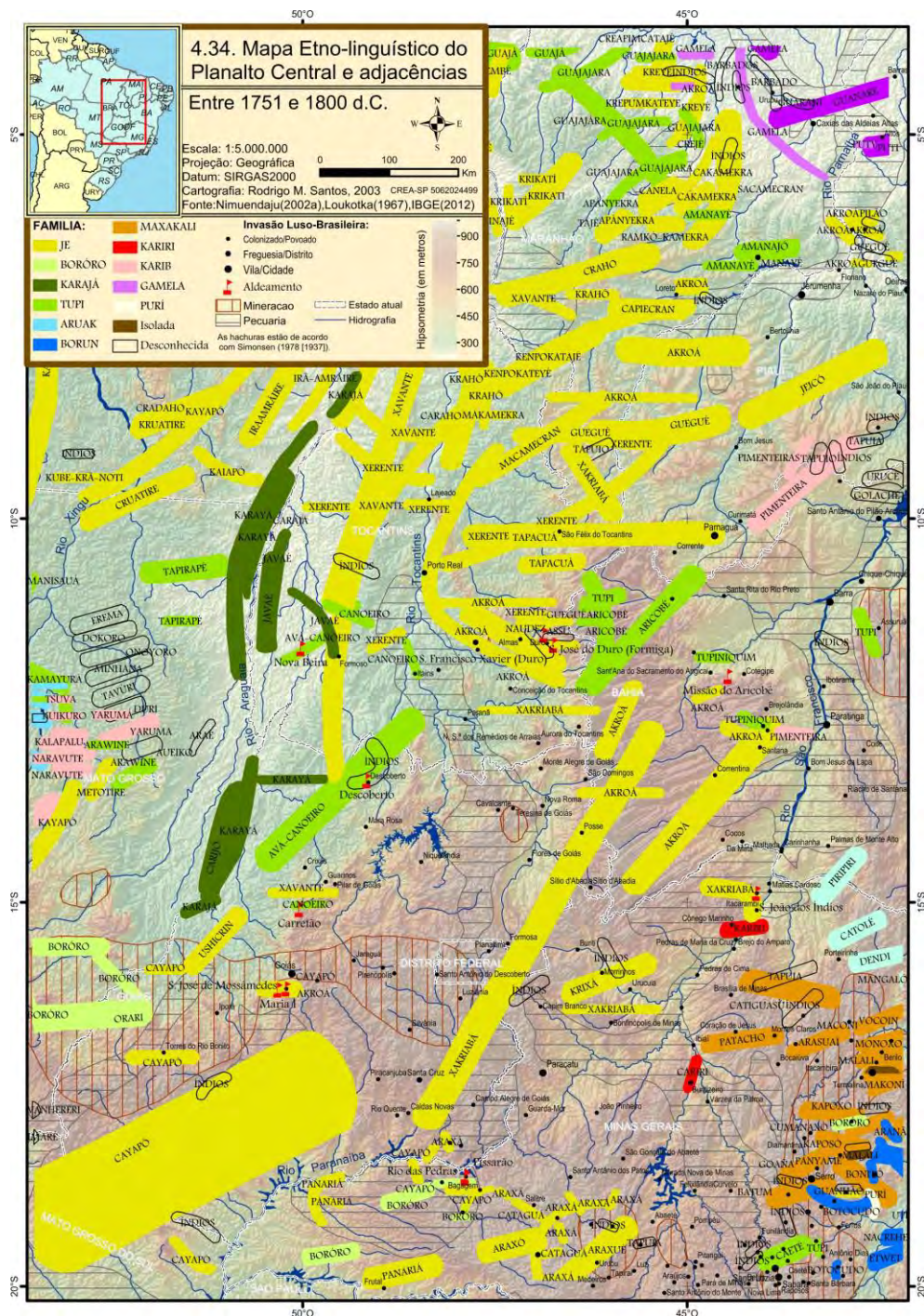


Figure 6. Brazil's Central Plateau ethno-linguistic map, between 1751-1800 AD.

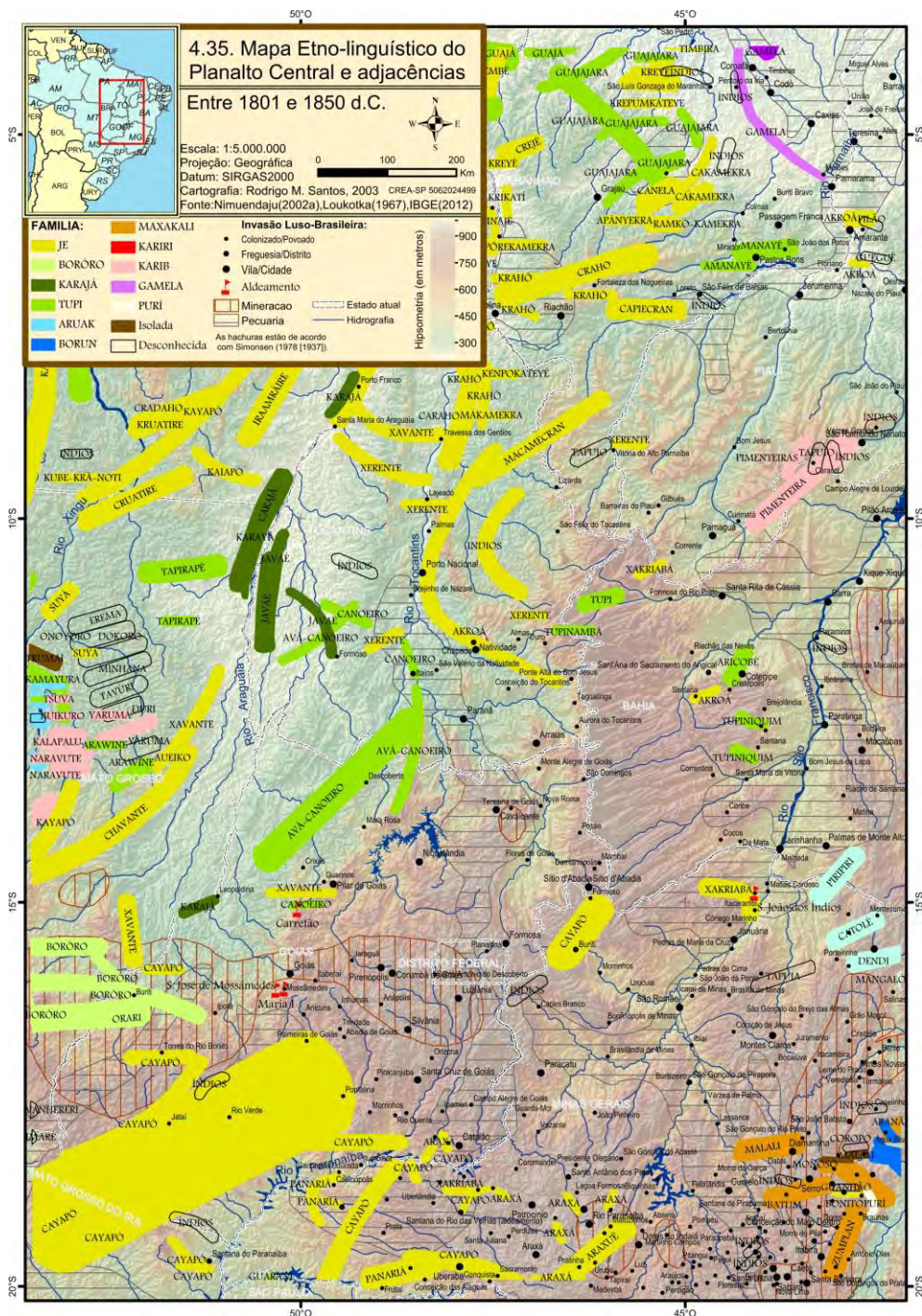


Figure 7. Brazil's Central Plateau ethno-linguistic map, between 1801-1850 AD.

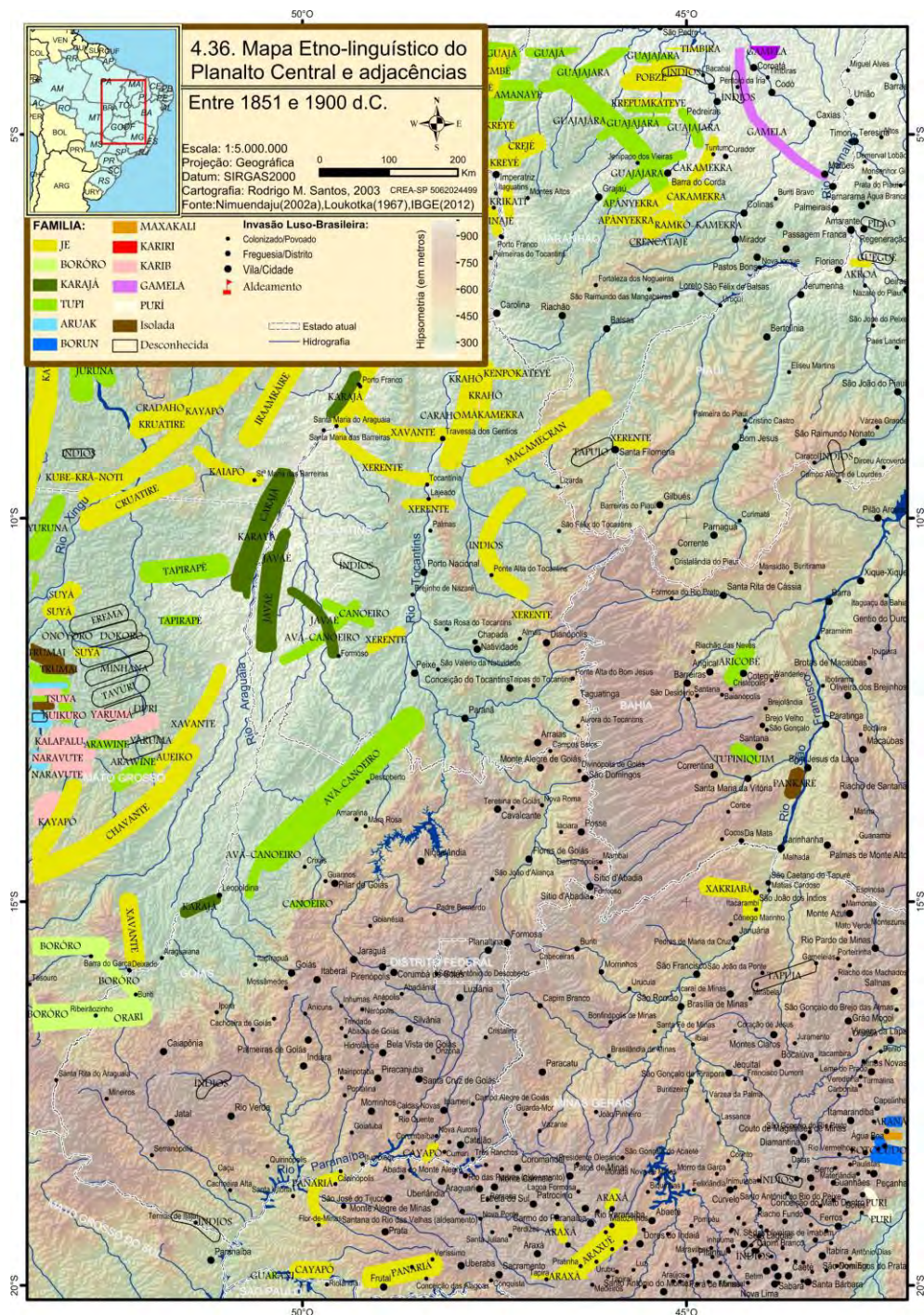


Figure 8. Brazil's Central Plateau ethno-linguistic map, between 1851-1900 AD.

Ethnic maps made by István Györffy

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Abstract. István Györffy was born in Karcag, Hungary in 1884. He became famous in Hungary for his work as an ethnographer. He started studying at the university of Kolozsvár (today Cluj-Napoca), and continued it in Budapest and earned a degree in geography there. He was later appointed as the first professor of Ethnography at the University of Budapest (today Eötvös Loránd University). In Kolozsvár he became a great admirer of Prof. Jenő Cholnoky, who at the time was one of the most famous lecturers in the field of geography in Hungary. Györffy made trips throughout all regions inhabited by ethnic Hungarians, furthermore the Balkans and the Anatolia. Being a geographer by training, he made many maps, the best known were his ethnographic maps. During and after the First World War he made such maps of the areas inhabited by ethnic Hungarian, the Balkans and Anatolia. In addition to the official data, he also used data he gathered by visiting these areas. In 1916 he mapped and published a map of Hungarians living in Moldavia and Bukovina. This map was taken to the Peace Negotiations of Trianon by the Hungarian delegation and was the only map taken there that showed areas inhabited by ethnic Hungarians outside of Hungary. In 1918 he published a map showing the ethnic diversity of northwestern Anatolia, showing its ethnic structure after the Balkan wars, but before the Turkish War of Independence after the World War. This is one of only two ethnic maps of Turkey published before 1987. After the first World War István Györffy made two ethnic maps, one of the countries on the bank of the Danube at a scale of 1:2 000 000 and the other of Transylvania at a scale of 1:1 500 000. The latter shows the areas of Hungary handed to Romania in the treaty of Trianon with the same contents as the former, but on a larger scale. It does however also show the Hungarians living in Moldavia and Bukovina west of the river Prut. Both maps were published in French.

Keywords. Ethnic maps, Hungary, Anatolia

1. Introduction

István Györffy was born in Karcag, Hungary on 11 February 1884. He started to study theology at the University of Kolozsvár (today Cluj-Napoca). Jenő Cholnoky was professor of Geography at the same time in the same university. Not only geography students attended his lectures, but also those from other faculties on a voluntary basis. It may be assumed that István Györffy was one of these students. After the first year he switched his study to geography and moved to Budapest. Despite his move, he kept contact with Cholnoky. In Budapest he was awarded as a teacher in geography and history. While still a student, he worked for the Ethnographic Museum in Budapest. He undertook many trips in the Carpathian Basin, the Balkans and Anatolia, during which he gathered information on the ethnic origin of the local population. He came to be known as the leading professor in the field of Ethnography in Budapest. In Hungary he is known to this very day as an ethnographer. From 1929 he held lectures at the University of Budapest (today Eötvös Loránd University). Due to his training and expertise in geography, his lectures were popular not only with students of ethnography, but also with those studying geography.

Györffy made many maps for papers he published on ethnography and settlements. His first maps were published in a paper he wrote about the Hungarian speaking population living for nearly a thousand years in the valley of the Fekete-Körös river (Romanian: Crișul Negru). This included three large-scale maps of the settlements that were analyzed in the paper, as well as a smaller scale map of the area.

2. Maps showing the population according to mother tongue

The census in Hungary recorded the mother tongue of the population. During the census every citizen made a statement as to what his/her mother tongue was. Although this was criticized by many people at the time, even scientists critical of the Hungarian government acknowledged the fact that at the time this was the only way to record ethnic origin. Even though these maps, according to their title, are called ethnographic maps, they are really maps indicating the mother tongue of the population. Besides the census data, Györffy had gathered data himself during his trips, making his maps even more interesting. In fact his map of Anatolia relied purely on his own data. Similar to the official census, he based his own census on the mother tongue of the individual.

2.1. Map showing Csángó Settlements

István Györffy's first map which included information about ethnic origin, was a map of the geography of Moldavia. Moldavia is a part of Romania to the east of the Carpathian Mountains, and should not be confused with Moldova, with is for some decades an independent country to the east of present-day Romania. On his map he showed the settlements inhabited by Csángos, a group of Hungarians living in Romania at the time. The total number of inhabitants of the settlements is indicated by symbols, and the percentage of Hungarians in these settlements is shown by its color. Györffy used the Hungarian place names on this map. This map was later taken to the peace talks in Trianon, but was not looked at during the peace conference. This map was not primarily an ethnic map, even though it does provide some information on the ethnic origin of the population. His first genuine ethnic map showed the population of Dobrogea. The map was printed in black and white using different patterns to show the different ethnic groups (*Figure 1*).

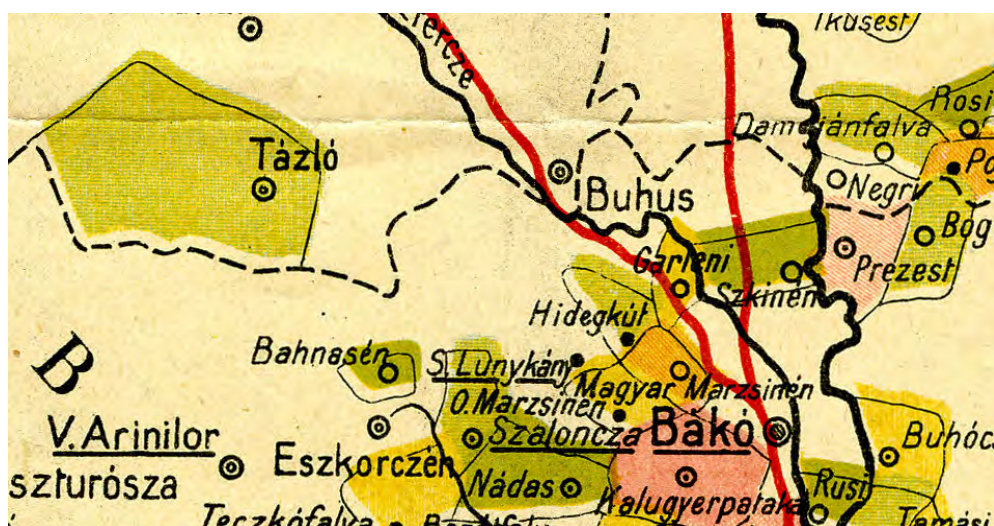


Figure 1. The surroundings of Bákó on the map showing Csángó settlements (Library of the Department of Cartography and Geoinformatics, Eötvös Loránd University, Budapest).

2.2. Ethnic map of northwestern part of Anatolia

In 1918 Györffy made an ethnographic map of northwestern part of Anatolia. The topography of the map was based partly on the third military survey by Austria-Hungary, and presumably partly on the topographic maps made by the Turkish high command. The former had a scale of 1:200 000, the latter a scale of 1:210 000. The map indicates all settlements including small villages, as well as very detailed hydrographical information. It shows the ethnic composition of the area after the refugees from the Balkan wars settled in the area, but before the Turkish wars of independence led by

Kemal Atatürk. As no Turkish census data was available, Györffy used the data he gathered when he visited these areas. Györffy spoke Turkish as did most of the refugees who settled in the different parts of Turkey. This made it possible for him to communicate with the locals and ask them where they stem from. This is the only detailed map known today that shows the ethnic composition of this region at that time. Györffy only made a manuscript of this map. A modern version was printed in 1999 at the Eötvös Loránd University in Budapest. The only other map published before 1987 showing the ethnic structure of Turkey was published in Moscow in 1964 at a scale of 1:7 500 000.

2.3. Ethnic maps showing the consequences of the Treaty of Trianon

Subsequent to the ratification of the Treaty of Trianon, István Györffy made a map showing the ethnic composition of the peoples living along the Danube.. The map was at a scale of 1:2 000 000. The original French title of the map was *Carte ethnographique des pays Danubiens*, while the Hungarian title was A dunai államok néprajzi térképe. A table at the bottom of the map contains a summary of the ethnic composition of Hungary, as well as of all states who gained territories from Hungary. The summary in the French version only shows information regarding Romania (*Figure 2*).

<u>La Hongrie historique.</u>	<u>L'ancienne Roumanie.</u>	<u>La Hongrie démembrée.</u>	<u>La nouvelle Roumanie.</u>
Territoire 282,870 km ²	Territoire 140,000 km ²	Territoire 91,114 km ²	Territoire 298,000 km ²
Population totale 18.264,000	Population totale 7.506,000	Population totale 8.004,000	Population totale 16.015,216
<u>Selon les nationalités:</u>	<u>Selon les nationalités:</u>	<u>Selon les nationalités:</u>	<u>Selon les nationalités:</u>
Hongrois 9.945,000	Roumains 6.545,000	Hongrois 7.093,000	Roumains 10.783,175
Allemands 1.903,000	Hongrois 152,000	Allemands 532,000	Hongrois 1.857,354
Slovaques 1.946,000	Allemands 30,000	Slovaques 166,000	Allemands 833,151
Roumains 2.948,000	Ukrains-russes 32,000	Roumains 49,000	Ukrains-russes 1.015,801
Ruthènes 464,000	Bulgares 192,000	Croates 48,000	Bulgares 321,600
Croates 195,000	Juifs 300,000	Serbes 36,000	Serbes 61,369
Serbes 461,000	Autres 248,000	Autres 80,000	Juifs 587,700
Autres 401,000			Autres 554,060

Figure 2. Summary of ethnic groups in Hungary and Romania on the bottom of the map *Carte ethnographique des pays Danubiens* (Library of the Department of Cartography and Geoinformatics, Eötvös Loránd University, Budapest).

Another map titled *La carte ethnographique des Transylvanie* showed the areas transferred from Hungary to Romania by the Treaty of Trianon. The scale of this map was 1:1 500 000, but the contents of the areas shown on both maps were identical. The latter map also showed the areas inhabited by Csangós to the east of the Carpathian Mountains. Both maps were printed in full color, and used colored surfaces to show the different ethnic groups. One copy of the map was dedicated to Jenő Cholnoky. On this copy Györffy wrote in pencil that to show his great respect (*Figure 3*), he intends to send this map to Professor Jenő Cholnoky.

Cholnoky Jenő professor urnak
mely tisztelettel a szerző

Figure 3. Hand written comment on Carte ethnographique des pays Danubiens dedicating the map Prof. Jenő Cholnoky (Library of the Department of Cartography and Geoinformatics, Eötvös Loránd University, Budapest). A similar message was written on a copy of the map La carte ethnographique des Transylvanie.

The maps show the borders of Hungary before and after the treaty of Trianon, as well as the historical boundary between Hungary and Transylvania. From this it can clearly be seen that Romania obtained more than just Transylvania and that the cities east of the current Hungarian-Romanian border are not in Transylvania. As in the ethnographic map of Hungary made by Paul Teleki for the peace conference in Trianon, the uninhabited areas on both maps made by István Györffy are shown in white (*Figure 4*).

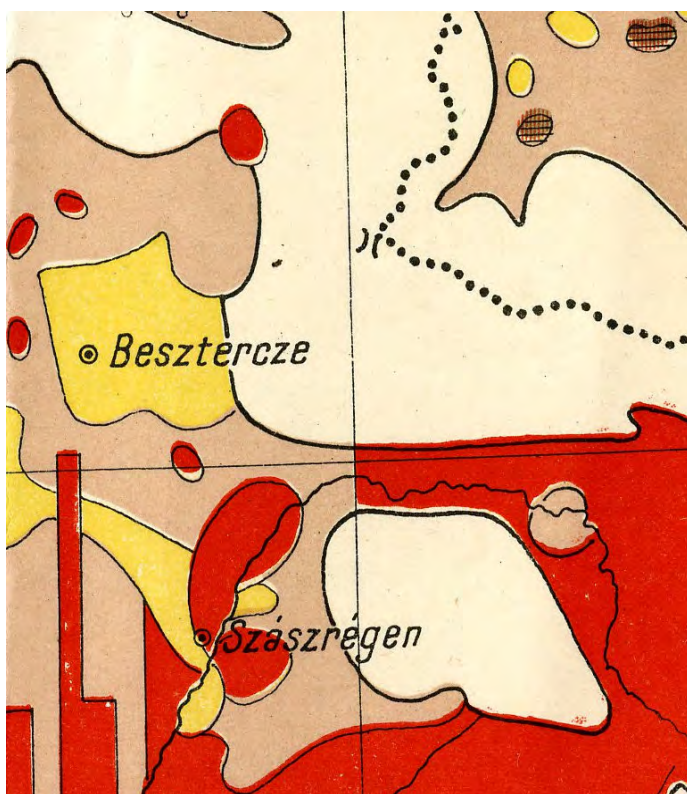


Figure 4. Uninhabited areas seen in white on the map La carte ethnographique des Transylvanie (Library of the Department of Cartography and Geoinformatics, Eötvös Loránd University, Budapest).

These were among the first ethnic maps of the Carpathian Basin using colored surfaces that showed the uninhabited areas. The areas of mixed population were shown using different colored vertical stripes. All place names in the areas that belonged to Hungary before the treaty of Trianon (excluding Croatia) are only written in Hungarian, while the Hungarian names of the places outside the former areas of Hungary are not used at all.

3. Maps of the ethnic composition of Kolozs County

Based on a book written by Dezső Csányi, István Györffy wrote a paper of the ethnic structure of Kolozs county in the 15th century, at the time of the Hunyadi dynasty. In this paper he made a map at a scale of 1:350 000 showing this information in geographical space. In the same paper he published a map of an identical scale showing the ethnic structure according to the census data of the 1910 census.

4. Topographic and Settlement maps

Of all the maps made by István Györffy, the best known are those made for his research analyzing the changes in the functional structure of the settlements of the Great Hungarian Plain. The most famous are the three maps of Hajduszoboszló at three different periods (1783, 1841 and 1892), the three maps of Hajdúböszörmény (1782, 1842 and 1910) and two maps of Hajdúhadház (1785 and 1926). The maps show the changes these settlements underwent over the indicated periods. After the First World War he also made use of the manuscript maps of the third military survey of Austria-Hungary in his studies, as the classification on these maps was lifted after the war.

5. Other maps made by István Györffy

István Györffy also published other maps representing historical-geographical themes. One of these was a map of the lands once belonging to Hungary in the Balkans. Another very interesting and rare map is that showing the areas awarded to Hungary by the Peace Treaty of Bucharest in 1918. Since this peace treaty was never ratified, very few maps were made of these changes in borders.

6. Conclusion

Even though István Györffy is best known in Hungary as an ethnographer, his knowledge of geography and cartography also played a very important role in his work. The maps based on his research were comprehensible to anybody reading his papers. Many of his maps are unique to this very day giving us information unavailable from any other source.

References

- János Györffy (2015). A térképek Györffy István munkásságában. Szlonok
- István Györffy. A dunai államok néprajzi térképe. Magyar Királyi Állami Térképészet, Budapest
- István Györffy. Carte éthographique des pays Danubiens. Magyar Királyi Állami Térképészet, Budapest
- István Györffy. La carte éthnographique des Transylvanie. Magyar Királyi Állami Térképészet, Budapest
- László Kósa (2000). Nemesek, polgárok, parasztok.
<http://www.tankonyvtar.hu/hu/tartalom/tkt/nemesek-polgarok/ch05s04.html>,
Accessed 28 June 2015

Ethnocartography in the Amazon region – Experiences with map production and use in Acre, Brazil

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Abstract. The paper presents results collected during more than 30 years of research and actions directed to native people mapping their lands and working with cartography. Indigenous groups were involved in learning about maps and geography during courses directed to teachers and environment agents engaged in activities related to conservation, forestry and agriculture at their lands in the state of Acre, located in the Brazilian Amazon region. This initiative is a very interesting case to show the relevance of maps to indigenous population, as the native people were involved in the whole process from gathering information and data, making mental maps of their lands and producing digital cartographic products. Since 1979, the CPI/AC (a NGO, named *Comissão Pró-Índio do Acre*) has offered courses for indigenous population in a project based on enabling them to take care of their lands, to protect their culture and traditions, in which cartography takes an important part. The native people are the authors of maps, drawings and texts. The *Atlas Geográfico Indígena do Acre* (Indian Geographical Atlas of Acre), published in 1996, is an example of the outcomes from this initiative. In the last two decades, many publications were realized by CPI as a result of their work, and maps have always been an important part of it.

Maps produced by the community in a collective effort reveal their perception of space and geographic knowledge aimed at problem solving and decision making to manage and protect their territories. Cartography plays a relevant role in this process. Maps, both the simple drawing made by a student and the digital products made by teams, were used successfully as cultural documents to treasure their traditions and ancestral knowledge and as technical tools to evaluate their lands, to locate their natural resources and to prepare environmental assessment and planning reports. These maps were used as teaching materials and as a means of capacity building for the

whole community. Many of these examples will be discussed in the paper. In this way, ethnocartography allows indigenous groups, as map makers and users, to achieve a vision of their social environmental reality, its complexity, its potential and its political constraints. This empowerment helps them to be the protagonists of their future, to discuss and plan the actions to reach the territorial management which they need to survive, to make maps to guarantee their rights, including watching their lands, protecting its frontiers and implementing new projects of community development. Ethnomaps, in fact, have many functions in the lives of native people; they are used in a greater variety of situations and for a number of reasons, from economical to cultural, maps can be works of art or precise digital representations of their land.

Keywords. Ethnocartography, indigenous maps, Acre

1. Native People as Unique Cartographers

This paper presents and discusses theoretical basis and concepts about indigenous and participatory mapping, bringing different views on purposes, methodologies, techniques and results. In order to achieve this goal, several examples are presented, the Ethnocartography project in Acre State, Brazil is analyzed, and the results are evaluated.

Images and maps have been relevant to society for centuries, but at the present, they became vital means to collect, process and represent all sorts of data and geographical information, both in digital and conventional formats. Technology has brought great innovations, people changed and got used to images and maps at work, school, in daily life, leisure, anytime and everywhere. Using a cellular phone in our hands or in our cars, we are map users, mapmakers taking advantage of cartography in both old and new ways.

Maps and images should be available to everyone and society is expected to give equal rights, respect and value all social, ethnic or cultural differences, including any physical, cognitive or sensorial deficiencies the person might have. For this reason, cartography have to be inclusive and presented in a multisensory and multicultural forms. Maps should reach all special needs users and minority groups, such as the blind, the deaf and the native people. They shall not be only users, but also map creators, learning and using computers and GIS. Digital technologies can make a difference in map production and use for people with special needs. Old questions discussed in cartographic communication process as what, why, how, to whom and with which results gain new meanings in this field of social, inclusive and participatory cartography. The experience developed by CPI-AC is one of the

most meaningful that took place in Brazil, in regard of ethnocartography. The results collected in 35 years of actions have been recognized in Brazil and at the international level.

The state of Acre had a total population of 733 559 in 2010 census (IBGE, 2012), with 2% of Native Indians (14 318 people), 31 Indian lands equivalent to 14% of the state area and 13 ethnic groups. Brazil had in 2010 a total population of 190 756 000 and 896 917 Native Indians, corresponding to 0,47% of the Brazilian people.

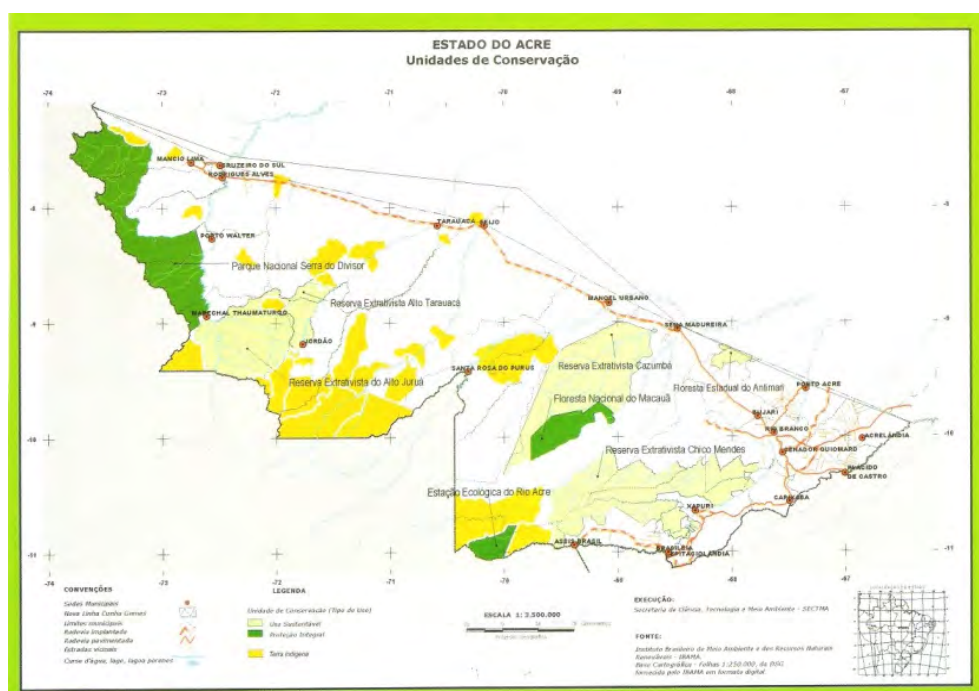


Figure 1. Conservation areas and indigenous lands in Acre.

The "*CPI/AC – Comissão Pró-Índio do Acre*" was founded in 1979 with the purpose of supporting indigenous groups, their struggles in keeping their land and helping the communities to ensure their right for health, education and environmental protection, through training courses and workshops for teachers, health and environmental agents (AAFI – Indian agroforestry agents), their actions were directed mainly to the State of Acre, Brazil.

2. Maps for and by Indigenous People: The Indian Geographical Atlas of Acre

In the last 35 years, CPI/AC collected significant results, especially in the areas of Geography and Cartography. From 1990, Renato Gavazzi coordinated projects and courses in these two areas. In 1996, the first geographical atlas was published, in collaboration with Marcia Resende. In 1997, they open up the "Centro de Formação dos Povos da Floresta", the first school for Native Indian teachers of Acre State. Maps have always been key to their work, CPI team participated in definition of the national parameters for Native Indian education, they published dozens of books in several Indian (indigenous) languages as well as in Portuguese covering various themes and disciplines. They have a library and an archive with over a thousand maps made by native people during activities at the center or at the villages during visits, courses and workshops.

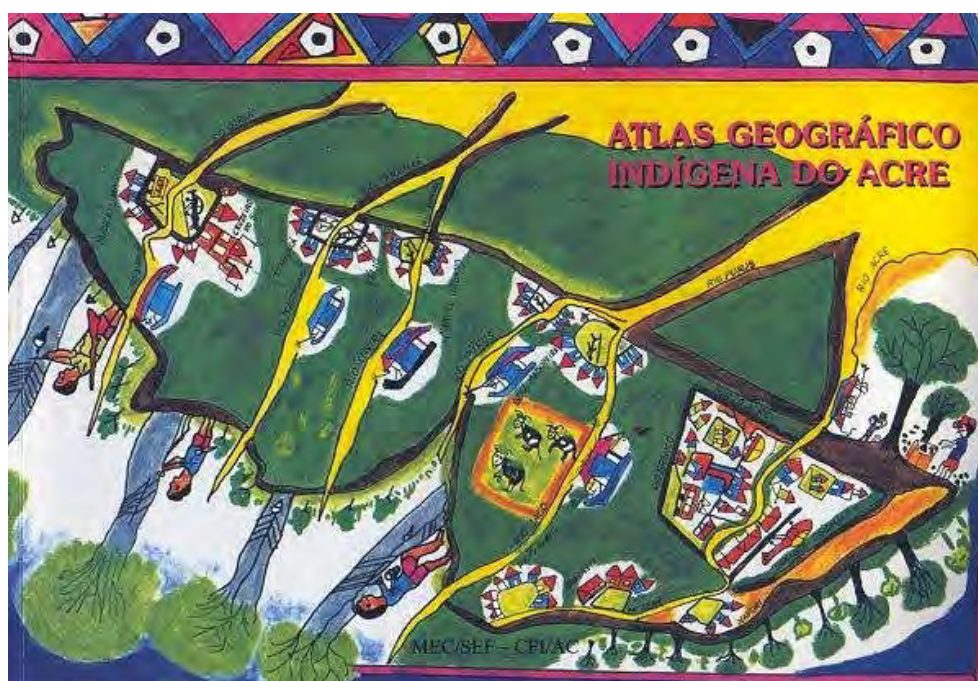


Figure 2. Indian Geographical Atlas of Acre Cover (Gavazzi, R.A. & Resende M.S. org. 1996, 1998).

The Indian Geographical Atlas of Acre (Gavazzi, R.A. & Resende M.S. org. 1996, 1998) was first published in 1996, as a result of five Geography courses for Native Indian teachers, that took place between 1993 and 1996, in CPI/AC. It has 28 maps and its 28 texts, all created by the indigenous participants. They are related to their own history, in a time and space always

reviewed in the present. The first atlas map (*Figure 3*) presents the list of native authors who made the illustrations, maps and wrote the texts. Some of them are poetic as the one showed in *Figure 4*.



Figure 3. The Indian Authors of the Atlas.



Figure 4. Acre in the Universe Map.

Many of the maps are political and cultural claims, from the past when they lost all their lands, but maps also portray a current reality with problems, conflicts and injustices.

The map of invasion (*Figure 5*) appears in the Atlas in the opposite side of a long text named *In these lands before being Brazil*: "our people, long ago, lived in these lands before being Brazil, before Acre. We were all free, easy going, our job was just to work in agriculture, hunting, fishing, collecting fruits and to celebrate life", these are the first two lines.



Figure 5. Acre history: Map of Invasion, Indian Geographical Atlas of Acre, 1998.

2.1. Teaching and Learning Geography at CPI-Acre

Geography has an important role in the curriculum for native education, both for indigenous schools at villages and in training courses directed to teachers and also environmental agents training. CPI always recognized the need for geographic and cartographic knowledge.



Figure 6. Geography books organized and published for use in indigenous schools. These editorial projects included illustrations and texts produced mostly by indigenous teachers.

During the first years of CPI education program, native teachers got so much involved in mapping activities that they decided to create new symbols and apply them to their map legend. For instance, they usually paint rivers in yellow "because their waters are not blue", as they say.

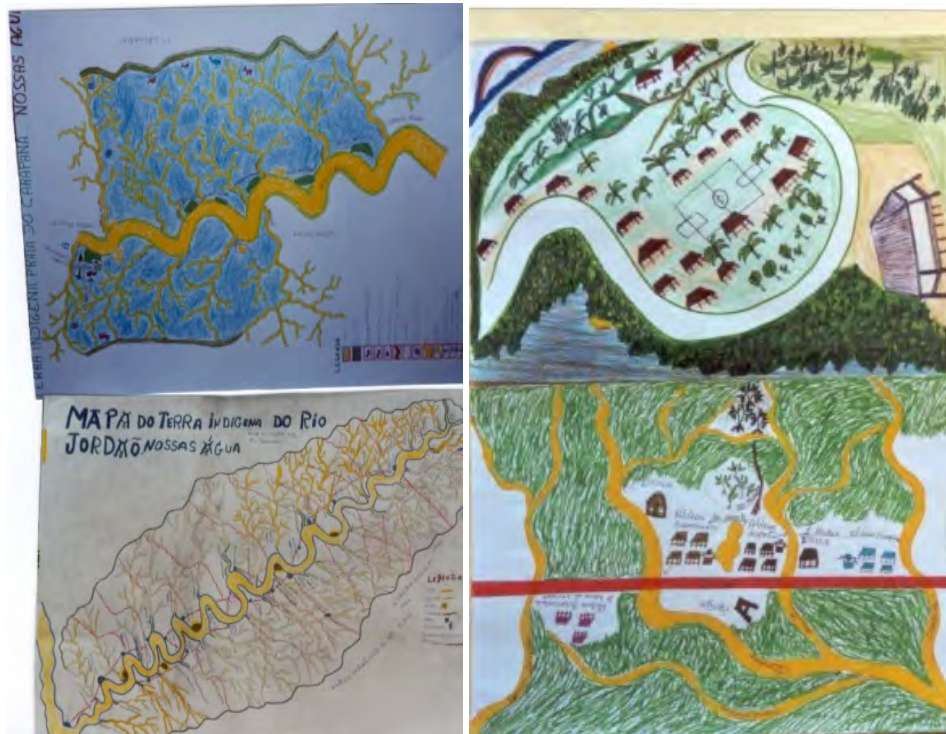


Figure 7. Examples of mental maps made during workshops in CPI-Acre, made during geography classes, 2000 (photos by R. Almeida).

All participants, teachers and agroforestry agents draw maps, and enjoy doing this. Some have a special ability for those tasks and their maps can look as works of art, such as drawings in *Figures 8 and 9*. The indigenous maps do not have only features which we are used to seeing. Their content might be much more complex, with not only objective information. Their cartographic language might express relationships, territories, and landscapes in conventional ways or as artistic expression and narratives. It is an experience in meeting ancestral knowledge, culture, symbols, imagination, and visions.

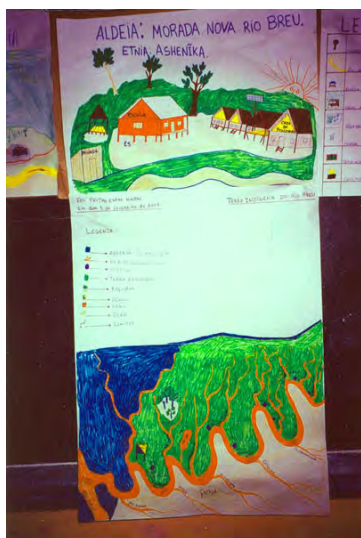


Figure 8. map drawing of an Ashannika village.



Figure 9. A map drawing as a work of art made by AAFI, Acre.

In Brazil, most villages have bilingual Native Indian teachers and schools. There is a national curriculum for indigenous education with rules, techniques and contents adapted to their needs. These guidelines are published in a book with the suggested curriculum with several disciplines, including geography and cartography. The idea of introducing maps to indigenous population is a very interesting one. In Brazil and in several countries, there has been experiences and projects involving cartography in different ways. All the initiatives in the Amazon Region worked with geography and cartography with very positive results.

Besides the work of CPI/AC, an important research was developed in the State of Amapá with the Waiãpis Indians (north of Brazil). The purpose was to teach cartography to this group, in order to make them able to understand conventional maps and to review the borders of their land, which were being demarcated by the federal government. They published the Book of Maps (Gallois, 1992), with maps made by Native Indians and conventional cartographers. The Waiãpis maps have more than just places since they represent their territory together with their history. The researchers were surprised by the ability of a group of ten Native Indians to make maps. These Indians became “cartographers” with great interest and joy in carrying out this new activity. This group did not have the word north in their language but they had a very good knowledge of space and all its physical features and they were delighted to learn scale, location, orientation and even how to understand remote sensing images (Almeida, 2001).

Considering the whole country, CPI is responsible for the oldest and most unique project related to indigenous education. They have a special curricu-

lum and all teaching materials were and still are written by native teachers with the help of consultants. They already prepared eight geography textbooks, besides publishing the Indian Atlas. Maps can be seen in most of their textbooks. These actions transformed their knowledge and, after having mainly an oral tradition, those books and their teachers brought new dimensions to their lives.

2.2. Workshops and Courses for Native Teachers and Environmental Agents

An education program that was used with children was adapted and introduced to the Native Indians during three teaching experiences. Exercises were designed to check the ability of these populations to make and read maps, such as to draw mental maps of their environment, to use maps at school and everyday life. All the activities were documented in a collection of drawings, photos and videos. The selected basic concepts, for example point of view, scale, distance, location and orientation, were presented to two different groups during courses and workshops: teachers from schools located at villages and local environmental agents. The second group, called Agroforestry Indian Agents – AAFI, are persons who need cartography the most, since their work is related to the geographical space and their cultural and physical survival. In this way, they are responsible for environment assessment, land management and sustainability of natural resources (Almeida, 2001).

The author was responsible for nine courses related to cartography and geography, in the period of the years 2000-2006. Some examples of activities developed during classes are:

- What is Geography and what is a map? Answer were given through text and drawings;
- Learning basic concepts – scale, location, orientation and graphic symbols;
- Mapping natural resources and environmental management actions;
- Outline of the Indian land geography using text and graphic representations (Almeida 2005, 2007, 2014).



Figure 10. Drawings made to learn compass directions.

Usually, Indians evaluated our maps as incomplete representations of their space, missing important features and details. Historical landmarks, which are gone for decades might be included in a native map. They used a lot of pictorial symbols and their maps resemble those made by children. In some cases, they got together to decide which symbol or color to use, as the example of depicting all rivers in yellow. Those Indians are also being exposed to conventional cartography in different ways. They enjoy maps as works of art, and at the same time, they recognize the need for cartographic products, in both digital conventional formats.

Their knowledge of the environment is remarkable, mainly in the case of men who usually have better ability to draw maps. The women stay around the houses and rarely are allowed to go inside the forest or walk in the outskirts of their lands. An interesting feature which can be observed in maps and written texts, is their ability of mixing science, art and magic, knowledge and intuition, facts and visions. They see time and space in much closer connections than us and they were very pleased to hear about the history of cartography. Perhaps they kept a form of wisdom and open mind, which we lost long ago (Almeida, 2001 and 2005).



Figure 11. Teachers and indigenous agroforestry agents in classes of Geography and Cartography in the CPI/AC Education Centre in Rio Branco, State of Acre.

3. Ethnocartography: The Challenges of Multicultural Mapping

The author has outlined a theoretical framework for cartography in previous work (Vasconcellos, 1991, 1996; Almeida, 2005, 2014), and in this case different features are highlighted, as for the evaluation of indigenous people as mapmakers and users, providing evidence and practical examples of whole cartographic process. Some perspectives and dimensions as seen on *Figure 12* are more relevant to Ethnocartography than conventional mapping. Usually special needs map makers and users do not fit to the conventional procedures and rules of cartography, particularly in the case of native people, there are other views to take into account.

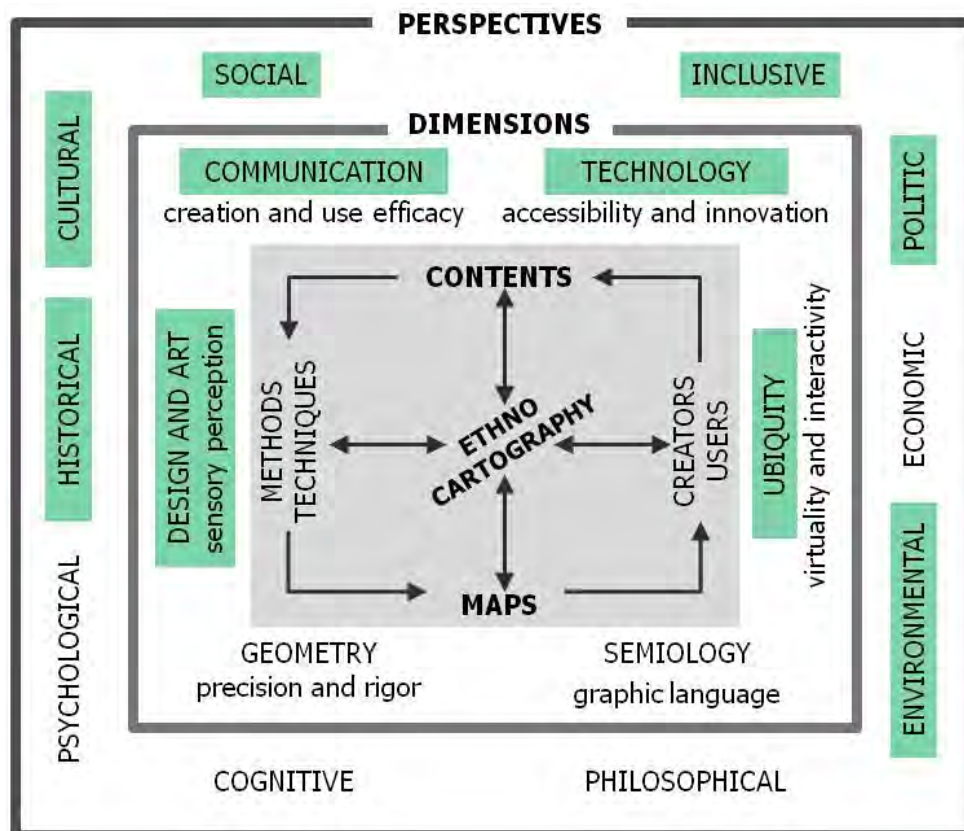


Figure 12. Theoretical Framework for Etnocartography.

The results discussed in this article, including the drawings and maps made by native people, can be analyzed in the light of these thoughts. They are good examples which show how unique ethnomapping outcomes are, considering the challenges of stepping outside conventional cartography.

4. Other Cartography and its Relevance to Indigenous Lands and People in Acre

In one of the workshops organized in CPI, the main goal was to learn, discuss and design the Agenda 21, based on their own knowledge and local experience. The participants were a group of 40 Brazilian native environmental agents who work in their lands in such tasks as organic agriculture, water resources management, pollution assessment, biodiversity protection, environmental education. Because they are bilingual, with Portuguese being a second language, there was a need for teaching many words and basic concepts prior to the design of an Agenda 21, as suggested in the Rio

1992 World Summit, in Brazil and in the 2002 Johannesburg Conference, in South Africa. These indigenous groups had been introduced to cartography in previous courses and they have a good understanding the graphic language which is nowadays part of their work.



Figure 13. Agenda 21 front cover drawn by Kaxinawa Indians at CPI – Acre.

Cartography had a key role in this process and all participants were asked to draw environment maps of their lands and to write an assessment of critical problems faced by the community. Each proposed agenda was taken back to their villages to be analyzed by the community and their leaders. In 2003, during one of the courses, they discussed and drew three maps, representing the past, the present and the future of their lands. The contribution of cartography was discussed and summarized, focusing its relevance to environment management and protection of their territory against invasions.

Experiences collected during courses given in Rio Branco, State of Acre, to Indian teachers and environmental agents allowed the author to review the initial results gathered previously (Almeida, 2001). The performance of the several participating groups went far beyond the expectations. Several results and themes were defined for further discussion:

1. Functions of a map for indigenous people, based on their answers: expressions of art; location and orientation; support to travel in space; definition of Indian lands and their borders; natural resources inventory and management; environment assessment and protection; awareness and actions towards nature preservation, and education.

2. Issues related to gender and age, making connections with map functions. The need for cartography and the ability to draw maps together with the knowledge of space varies greatly between sexes and ages, as culture and ancient costumes define their tasks. Only men can hunt and enter the forest, so they know the land very well, all rivers and geographical features. For women, maps have the function of presenting the geographical space they do not know, same as for the visually impaired, maps can bring reality to their eyes, while for men, they are graphic representations of mental images and thus abstractions of real space.
3. Ways to introduce digital technologies such as GIS, remote sensing, and digital cartography in the training courses for Indian environmental agents. They are in charge of promoting sustainability of their natural resources, in a time of population growth and constant invasion of their lands. Satellite images and digital maps can help them in this task of controlling remote areas.

Previous work done by the author (Vasconcellos, 1996, 1999, 2000, 2001) summarizes applied research and the evaluation of maps as a means of communication. Conventional approaches and previous studies on cartographic design do not fully apply to special needs cartography, particularly indigenous users. Most native people transform mental images of their space into very interesting graphic representations, and their maps depict not only places, but also history, culture, collective memories and ancestral knowledge.



Figure 14. Environmental Management Map showing Indian Land and its resources and problems, Comissão Pró-Índio do Acre/CPI.

Among proposals for 2004-2006, environment management actions were outlined, with a strong emphasis on mapping techniques and graphic representations in general; remote sensing images and GPS were included. During exercises proposed in the 2004 courses, Native Indians were asked to produce 3 maps from different periods of time, representing past as their memories, present as reality and future as their dreams. In groups of 5 to 6 people, they produced maps, text and drawings and presented at the last day of the week. Results were outstanding and maps were images of their collective memories and dreams.

They always enjoy working with maps, they see many relevant applications and results and, each time more, they want to learn and practice cartography.

As a Native Indian teacher called Raimunda said during an evaluation of a mapping activity: *"Lots of thinking... Other people's dreams are reality. Like a photo, while looking at a map, we could travel in the other person's mind. Each one of us has a dream!"*



Figure 15. Environmental Management Map showing Indian Land and its resources and problems, Comissão Pró-Índio do Acre/CPI.

4.1. Cybercartography and indigenous mapping

Cybercartography is a new paradigm for maps and mapping in the information era. Defined as "the organization, presentation, analysis and communication of spatially referenced information on a wide variety of topics of interest to society," cybercartography is presented in an interactive, dynamic, multisensory format with the use of multimedia and multimodal interfaces (Taylor & Lauriault, 2014). The authors in this book examine the major elements of cybercartography and emphasize the importance of interaction between theory and practice in developing a paradigm which moves beyond the concept of Geographic Information Systems and Geographical Information Science. The new practice of mapping traditional knowledge in partnership with indigenous people has led to new theoretical understanding as well as innovative cybercartographic atlases.

Plurality, inclusion and accessibility are still challenges for the field of modern cartography, what could better be achieved by the cybercartography paradigm proposed before (Taylor, 2005, 2014). Every person is entitled to be a map user and a map creator. This requires all people to be given equal opportunities, to gain information through maps and cartographic images, as well as the need to facilitate map use and mapmaking for minorities and special needs groups. As a result adapting the cartographic language in different ways becomes necessary, as do the tactile formats, technological

innovations and new methods of approaching cartography, such as participatory mapping and social cartography directed to indigenous populations.

There is need to define the group of creators and users, discuss the role of perspectives and dimensions, and their participation in a new vision of cartography. The cartographic communication paradigm from the 1970's cannot be fully applied to the new interactive forms of digital cartography. The variables highlighted in the theoretical framework (*Figure 12*) previously presented by the author were the most important to tactile mapping (Vasconcellos, 1995), in a time when ICT did not yet have the relevance it has today. Indigenous cartography can be also considered inclusive not because any physical disabilities, but for cultural or ethnic reasons, involving socio-economic and political issues, identity in danger as well as integrity of territories, because discrimination and lack of respect for their ancestral history.

Chapin (2006) defines indigenous mapping as mapping done by and for indigenous peoples to achieve political objectives. It was first carried out in Canada and Alaska in the 1960s and 1970s, primarily to claim and defend land and natural resources and to strengthen political organization, recording traditional history and culture, developing education programs on a variety of topics (such as the environment), and planning for economic development. A variety of methodologies have made their appearance, ranging from highly participatory approaches involving village sketch maps to more technical efforts with geographic information systems (GIS) and remote sensing. In general, indigenous mapping has shown itself to be a powerful tool and it has spread rapidly throughout the World (Chapin, 2005, 2006).

Another outstanding Brazilian initiative is called “New Social Cartography of the Amazon”, coordinated by Alfredo Wagner. This project is based on organizing mapping workshops and activities, where the local people select the information they want to put in the map, expressing their perceptions and highlighting problems and conflicts, and learning how to use new technologies. The Project expanded its mapping workshops to include areas outside of the Amazon in Series 2 - New Social Cartography Project of Traditional Peoples and Communities of Brazil. The PNSCA publications and more information can be downloaded from the website: <http://www.novacartografiasocial.com/>.



Figure 16. Examples of New Social Cartography publications (brochures 7 and 31).

Each brochure is the result of a combination of collaborative efforts and relationships between a community or traditional group and the research team; all brochures have pages of text and an A3 sized map. One thousand copies of each brochure were printed most of them staying with the local group for their own use. *Figure 16* shows two examples of this publication. Between 2005 and 2012, over 120 brochures, organized in 6 series, were produced, together with maps, books and videos.

Mapping for and by Amazonian natives makes Brian Harley's arguments became alive (Harley, 1989, 1990), and the scenario encompasses even more when ICT give to maps a new future which can meet the past and transform the present. Indigenous groups in Brazil are witnesses of that. There have been many cartographies, there always will be more to come in the field of maps (Almeida, 2014). *Figure 17* shows the same area of a Kaxinawa land, in a mental map (drawing) and georeferenced map made using computers.



5. Final Remarks: Ethnocartography in the Information and Imagination Ages

The Imagination Age is a theoretical period beyond the Information Age where creativity and imagination will become the primary creators of economic value. This contrasts with the information age where analysis and thinking were the main activities. The concept holds that technologies like virtual reality, user created content and YouTube will change the way humans interact with each other and how they create economic and social structures. A key concept is that the rise of the immersive virtual reality, the cyberspace will raise the value of imagination work of designers, artists, video makers and actors over rational thinking as a foundation of culture and economics (Wikipedia, August, 2015). Maybe cartography will have to rethink its priorities and goals if the Imagination Age becomes a reality.

There has always been many types of cartography and, for this reason all sorts of maps, from a simple mental map full of cultural expressions made by Amazonian native people or a collage tactile map made with different textures will survive, side by side, with new digital, virtual maps in cloud computing. Neither is to be disregarded due to their different functions or reasons of existence. Inclusive cartography means creating maps with a multisensory and multicultural graphic language, images that can reach different users taking advantage of the available ITC. In new formats such as presented by Telecartography and Internet maps can be used by everyone. Providing the right technology to assist any special needs, maps can be used anytime and anywhere. Much has been done but there is still a need for hard and software development, for instance to allow blind and deaf persons to access every kind of cartographic information, of sound and images. Vision and hearing are senses dominant to people, as compared to touch which means that a person not being deaf or blind, does not think about touching or smelling to get information from the environment or to

navigate in space. Cybercartography can change that by exploring new pathways to map creation and use (Almeida, 2014).

Cartography and participatory mapping can facilitate the empowerment of communities to deal with political issues and to seek social, environmental and economic sustainability. In the case of regions such as the Brazilian Amazon, maps can help people to be protagonists of their future, reaching community development. There have been many projects all over the world about social cartography and participatory mapping, but still there is need to discuss and disseminate achievements collected so far. Native people can give lessons about how to look at the future, but not forget the past, how to look forward to innovative technology but yet to draw mental maps as works of art. Plurality and accessibility are critical issues in modern cartography (Almeida, 2014).

References

- ALMEIDA, Regina Araujo de (2015). Tactile Maps IN International Encyclopedia of Social & Behavioral Sciences, Elsevier, UK. (Internet and printed version).
- _____. (2014) Inclusive Cartography: Theoretical and Applied Issues in Brazil. In: Taylor, D.R.F., Lauriault, T.P. (Eds.), *Developments in the Theory and Practice of Cybercartography*. Elsevier Science, chapter 8, 107-128.
- _____. (2007) Ensino de Cartografia para Populações Minoritárias. In: Boletim Paulista de Geografia. AGB, São Paulo. p.111-129. http://www.agbsaopaulo.org.br/sites/agbsaopaulo/files/BPG_87_Cartografia.pdf
- _____. (2005). Ethnocartography Applied to Environmental Issues. In: Annals - XXII International Cartographic Conference - Mapping Approaches into a Changing World. La Coruña. Proceedings XXII International Cartographic Conference.
- _____. (2001). Cartography and Indigenous Populations: A Case Study with Brazilian Indians from the Amazon Region. Proceedings, 20th International Cartographic Conference – ICA. Beijing, China.
- ALMEIDA, Regina Araujo e GAVAZZI, Renato A. (2011). Ethnocartography and native people in the Amazon Region – experiences with map production and use in Acre, Brazil. Proceedings XXV International Cartographic Conference. Paris.
- CHAPIN, M. (2006) Mapping Indigenous Lands: Issues & Considerations, Center for the Support of Native Lands. 19p. at: <http://globetrotter.berkeley.edu/bwep/colloquium/papers/Chapin2006.pdf>, retrieved Feb 6, 2013.
- CHAPIN, M; ZACHARY L. Z, and THRELKED, B. (2005) Mapping Indigenous Lands. *Annual Review of Anthropology* 34: 619-639.
- GALLOIS, D. (1992). Livro de Mapas: Território Waiãpi. Centro de Trabalho Indigenista, São Paulo.
- GAVAZZI, Renato A.. Agrofloresta e Cartografia Indígena: a gestão territorial e ambiental nas mãos dos Agentes Agroflorestais Indígenas do Acre. Dissertação de Mestrado. Faculdade de Filosofia, Letras e Ciências Humanas Departamento de Geografia - Universidade de São Paulo USP, 2012a.

- _____. (Org.) Etnomapeamento da Terra Indígena Kampa do Rio Amônia – O mundo Visto de cima. Edição e Organização – Programa de Gestão Territorial e Ambiental – Comissão Pró-Índio do Acre CPI/AC – Brasília, 2012b.
- _____. Mapear é preciso - experiência de mapeamento participativo em Terras Indígenas no Acre - Anais do II Simpósio Internacional Caminhos Atuais da Cartografia na Geografia - Universidade de São Paulo – USP – São Paulo, 2010.
- GAVAZZI, R. A (org.) (1993) Geografia Indígena –CPI-AC , Rio Branco.
- _____. (org.) (1996) Geografia Indígena. Instituto Socioambiental / MEC / PNUD, Brasília.
- GAVAZZI, R.A. & REZENDE M.S. (org.) (1996, 1998). Atlas Geográfico do Indígena do Acre. CPI-Acre, Rio Branco.
- HARLEY, J.B. (1989). Deconstructing the Map. *Cartographica*, 26(2), 1-20.
- HARLEY, J.B. (1990). Cartography, Ethics and Social Theory. *Cartographica*, 27(2), 1-23.
- IBGE - Instituto Brasileiro de Geografia e Estatística. (2012) Os indígenas no Censo Demográfico 2010. Rio de Janeiro, 31p. http://www.ibge.gov.br/indigenas/indigena_censo2010.pdf
- MARCHESE, Daniela & ALMEIDA, Regina Araujo de (2005). La Rappresentazione dello Spazio nei Popoli della Foresta: riflessioni su due esperienze di campo condotte tra Indios e Seringueiros dell'Acre. *QUADERNI Quadrimestrale di psicologia e antropologia culturale*, vol.14, p.57-70.
- MEC – Coordenação Geral de Apoio às Escolas Indígenas (1998). Referencial Curricular Nacional para as Escolas Indígenas. Brasília.
- MUNDY, Barbara (1998) "Mesoamerican Cartography" Chapter 5 in Woodward, D and G.M. Lewis, *The History of Cartography*, Vol. 2, Book 3, University of Chicago Press, Chicago and London.
- TAYLOR, D.R.F. (2005). *Cybercartography: Theory and Practice*. Elsevier, Amsterdam.
- _____. (1991). A Conceptual Basis for Cartography: new directions for the information era. *Cartographica*, Canada, University of Toronto Press, 28 (4), 1-8.
- TAYLOR, D.R.Fraser & Lauriault, Tracey P. (2014) *Developments in the Theory and Practice of Cybercartography: Applications and Indigenous Mapping*, Elsevier Science. 380p.
- TURNBULL, D. (1989). *Maps as Territories*, Science in an Atlas. University of Chicago Press, Chicago.
- VASCONCELLOS, A.A.Regina. (1991). Knowing the Amazon through Tactual Graphics. In: *Proceedings 15th International Conference - ICA*. Bournemouth, Great Britain, 1, 206-210.
- _____. (1996). Tactile Mapping Design and the Visually Impaired User. In: Wood, C. & Keller, P. (eds.) *Cartographic Design: Theoretical and Practical Perspectives*. John Wiley & Sons, England.
- WOODWARD, D., Lewis, M.L. (1998) *The History of Cartography. Cartography in the traditional African, American, Arctic and Pacific societies*, vol. 2. Book 3. University of Chicago Press, Chicago.

The Field Collection in The Certification of Geographical Names and The Preservation of Cultural Heritage

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Abstract. Geographical names are an archive of the history and culture of the people, in which information of various natures can be stored. Thus, methods of standardization have to consider the need to preserve the information they contain. Also, because they are dynamic – nomination is determined by various injunctions, including religious, political, economic, or any other, causing names to be corrupted in form and/or pronunciation or even changing them – it is necessary that the names are systematically analyzed, since they are subject to relatively frequent changes.

The Reference Center on Geographical Names (CRNG) and the Management of Geodesy and Cartography of the State of Santa Catarina GGC-SC of the Brazilian Institute of Geography and Statistics (IBGE), drawing from the experience gathered in project carried out in an institutional partnership built between the IBGE and the Institute of Land and Cartography of the State of Paraná - ITCG / PR, developed a method of *certification* to review, update and endorse the geographical names contained in the systematic mapping of Brazil in 1: 50,000 scale, standardizing them.

This paper focuses on the *field collection* of geographical names, highlighted in this method, since the field is understood as the main source of information, according to the UNGEGN's recommendation that standardization should be based on the local and current use of spelling and pronunciation of names. The collection activity in the *certification* of geographical names differs from the traditional survey for the systematic mapping of Brazil, since it is intended to solely obtain information regarding geographical

names. In addition to collecting them, it is the *certifier's* job to ferret out information which allows us to situate the toponym in time, culture and power relations, that is, in the social fabric. Seeking therefore to reveal the various motivations that led to the nomination as well as the etymology of names. This data will be used for the subsequent standardization of the collected name and constitute important corpus of information about the history and local culture.

Keywords. Standardization of geographical names, field collection, cultural heritage

1. Introduction

Geographical names are an invaluable source of information on the history and culture, and may store a great deal of information on the feature they name and on the human group which gave this name, such as origin and language of this people, its economical production, festivities, etc., as well as vegetation in a given area, fauna inhabiting the area, etc., not to mention the importance of geographical names as identity marks and demonstrations of power. Thus, the knowledge about the nomination process of a place may contribute to many fields of study and to the promotion of cultural values.

However, so as to profit fully from all the informational potential of the geographical names, it is necessary to avoid misidentification of features and lack of accuracy in the retrieval of the information that may be in a name. For that reason, the standardization of geographical names is urgent and necessary. It involves both the georeferencing and the form of the names, including spelling, pronunciation and the use of diacritics and it is crucial that the methods for their standardization consider the need to preserve the information they contain.

Taking into consideration that geographical names are a result of the interaction between man and the space we live in, arising from the necessity to identify and refer to the various features around us, it is easy to understand that, although some names remain for a long time, others end up changing, due to changes in the society inhabiting the place and in the area itself, be these changes religious, political, economic, or any other, causing names to be corrupted in form and/or pronunciation or even changed. Due to this, it is necessary that the names are systematically analyzed, since they are subject to relatively frequent changes (SEEMANN, 2005).

In order to keep track of this dynamics, and to fulfill its institutional mission of "portraying Brazil by providing the information required to the understanding of its reality and the exercise of citizenship", offering a com-

plete and current view of the country, meeting the demands of several segments of the civil society and government bodies at all levels, the Brazilian Institute of Geography and Statistics (IBGE) developed the *method of Certification*.

This paper focuses on the collection of information on geographical names in the field, which is the aspect which presents the most significant differences between the method of Certification and the traditional method for the production of new mappings and updates, used by the institutions which are responsible for the systematic mapping of Brazil, namely the IBGE and the Brazilian Army.

2. Certification of Geographical Names

The method used in the Certification of geographical names was developed by The Reference Center on Geographical Names (CRNG) and the Management of Geodesy and Cartography of the State of Santa Catarina GGC-SC, both of which departments of the IBGE. It follows the recommendations of the UNGEGN for the standardization of geographical names and is derived from the experience gathered in a project carried out in an institutional partnership built between the IBGE and the Institute of Land and Cartography of the State of Paraná - ITCG/PR.

The Certification is applicable in rural areas of pre-existent mappings in order to keep track of alterations in the names and to review, complement, update and endorse the geographical names in the 1:50.000 topographic sheets of the systematic mapping of Brazil, which are already about 40 years old. The term *certification* here must be understood as *standardized and officially stated as correct*.

So as to proceed standardization efficiently and consciously, the IBGE has researched on linguistic, cultural and historical information on geographical names whenever necessary, both in office and field research. However, rendering accurate names and geometry to the features in the maps was always the main aim. The Certification proposes an addition to the traditional cartographic view on geographical names as it places special emphasis on their cultural aspects.

The organization, storage and dissemination of the information on the names is expected to preserve and promote a higher awareness of values of the Brazilian cultural heritage, and an increase in the sense of pride and ownership of the place one lives in (CORRÊA, 2003).

All types of geographical names can be certified, such as names of populated or non-populated places, man-made or natural features, sacred areas, and others.

The method of Certification involves three basic steps: the preparation for the collection in the office; the field work, which is the collection itself; and the analysis of the material collected and subsequent standardization of the names, in the office.

Following recommendation 2 of UNGEGN resolution VII/5 ¹, which states that national standardization must be based on local usage, the interview with the inhabitants of the area is the primary source of information for the collection of geographical names, both in the traditional survey and in the survey for Certification. However, the differences in approach between the two kinds of survey will be dealt with in the next sessions.

2.1. Differences between certification survey and traditional survey regarding the collection of names

The traditional survey and the certification survey are similar in that they are carried out in direct contact with the informants and have two distinct phases, the planning in the office and the field activity itself. However, they differ from one another mainly regarding the focus of their activity. The traditional survey is carried out for the production of new maps and the updating of the existing one. Therefore, as far as geographical names are concerned, they are treated solely as an attribute of the geographical feature to be mapped. Collecting them in the field is only one of the activities performed by the surveyor, along with the classification of features, their geometry and other activities.

On the other hand, the certifier is solely concerned with the NAMES of the features and only collects information related to them. They aim at confirming, maintaining, altering and including names in the 1:50,000 topographic database. Also, it is the certifiers' job to ferret out information which allows us to situate the toponym in time, culture and power relations, that is, in the social fabric. Therefore, seeking to reveal the various motivations that led to the nomination as well as the etymology and meaning of names. This data will be used for the subsequent standardization of the collected name and constitute important corpus of information about the history and local culture.

So as to collect all this information, the interview with the informers is longer than the one carried out in the survey for new mappings and updates, which can be very short, focusing on the geographical name itself.

¹ The UNGEGN resolutions are available at http://unstats.un.org/unsd/geoinfo/UNGEgn/docs/RES_UN_E%20updated_1-10%20CONF.pdf

Due to the differences in objectives and concerns of the two kinds of survey, the office preparation in each one of them involves distinct research sources. The preparation for surveys for new mappings and updates consists mostly in the gathering and analyses of cartographic documentation and image files, legislation regarding limits of special areas and some superficial cultural research focused mostly on the accent of the inhabitants of the area covered by the survey. By contrast, the office preparation for the certification survey is extensive and involves research in historical, administrative and cultural documents besides those used in the other kind of survey (*Table 1*).

Field survey for new mappings and updates	Certification field survey
- FOCUS ON THE GEOGRAPHICAL FEATURES (name as an attribute) > Collection of names and classification of geographical features, among other activities	- FOCUS SOLELY ON THE GEOGRAPHICAL NAMES OF FEATURES > confirm, maintain, alter and include names
- Names: geometry and classification of the feature named	- Collection of information on linguistic, social and historical aspects of the establishment of the name
- Office pre-field preparation: basically consists in the gathering and analyses of cartographic documentation and image files, legislation (limits) and superficial cultural research (pronunciation)	- Extensive office pre-field preparation: gathering and analyses of historical, administrative and cultural documents, in addition to cartographic documents and image files
- Short interview, focused only on the geographic name itself.	- Longer and more detailed interview, aiming at obtaining linguistic and historical information.

Table 1. Differences between certification survey and traditional survey regarding the .. collection of name.

2.2. Background research for Certification of Geographical Names

As mentioned above, extensive background research is carried out in the office, gathering information on the area and names under certification. This step is known as office pre-field preparation.

The basic documents used in the background research on the names are, following recommendation B of UNGEGN resolution I/4:

- Mapping of the area in all available scales (1:25,000, 1:50,000, 1:100,000, 1:250,000) produced by the IBGE and the Brazilian Army;
- Latest statistical maps and State historical maps produced respectively by the IBGE and state mapping agencies;
- Descriptive of special areas, municipal, state, and national boundaries;
- Historical mappings.

Other documents have also been proven helpful, whenever available:

- Mapping by municipalities, telephone, water and energy companies;
- Remote sensing images (including Google Earth);
- Lists of schools and churches associated to the localities where they are situated, issued by the municipalities and the dioceses.

For general information on the area and on linguistic and historical information on the geographical names in it, the following documents are used:

- Cidades @: <http://www.ibge.gov.br/cidadesat/index.php>
- Documentação Territorial do Brasil, at Biblioteca do IBGE: <http://biblioteca.ibge.gov.br/>
- Official sites of municipal governments;
- Academic dissertations and thesis on the origins and evolutions of the names of geographical features;
- Information on the historical importance of the region, its economic production, characteristics of the population such as ethnic characteristics, religion, accent.

These sources are analyzed and compared for possible conflicts regarding geographical names: the name itself, name extent, position, category and such. Linguistic issues are also raised, such as in names with spelling, number and gender concord not in accordance with current grammatical rules, names containing words inexistent in standard Portuguese, names whose pronunciation is not clearly defined by their written forms (such as "Linha Avaré II": is the "II" read as "two" or "second"?). In all these cases, research is necessary to find out whether the name in the map was mistyped or if it is correct for a particular reason).

All the information gathered about the names and all the inconsistencies encountered that could not be solved by office research are organized in one single document, to be used both in the office preparation and in the field. Besides being extremely practical to handle in the field, this one document allows the certifier to have all the extensive corpus of information on each name summarized in the same place. It is easier to visualize everything and establish contrasts and make assumptions.

By using a free GIS software called QGIS, point shapefiles are created over a raster layer of the most recent 1:50,000 survey of the area being studied. The use of rasters that are adequately georeferenced allows the extraction of toponymy from maps, so that it can be stored, studied and organized into a database. Each point refers to the toponym to be certified and is placed next to where it is written on the map. By accompanying the repetition of names,

we can keep track of the name extent – and alter it if necessary. That is to say that it is also possible to, roughly, record the name length.



Figure 1. Comparative analysis and organization of information for field activity in the office – creating shapes.

After the creation of the shapefiles, we complete the attribute table (*Figure 2*) with the information on the toponym gathered in the office research. The attributes of the table are:

1. Identification number of the point shapefile;
2. Name being researched;
3. Category of the feature named, expressed in code (ex. locality (LOC), municipality (9.02));
4. Identification of map sheet from where the toponym was extracted;
5. Other sources of research where the name can be found;
6. Field instructions: description of the issue(s) encountered in office research, if applicable (ex. "check for the correct name: Arroio Passo

da Cruz in the 1:50,000 base and Arroio da Cruz in the statistical map");

7. Variant(s), if applicable;
8. Status of the name according to the field research (ex. confirmed, updated, corrected, included, etc.);
9. New name collected in the field, if applicable;
10. Previous name(s) of the feature, if applicable;
11. History, origin, motivation and meaning of the name;
12. Comments;
13. Informers.

Columns numbers 1-4 are always filled out in the office, while columns 6, 7 and 11 may only be filled out during field work. Columns 5, 8, 9 and 10 can either be filled out in the office or during field work, depending on where the information is available. In some cases some fields in these columns will be filled out in the field, while others in the office.

id	nom	latitude	longitude	altitude	type	description	origine	statut	historique	commentaire	notes	commentaire
1	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
2	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
3	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
4	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
5	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
6	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
7	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
8	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
9	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
10	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
11	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
12	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio
13	Arroio da Cruz	32.02	-51.30	140	Arroio	Arroio da Cruz	Arroio	Arroio	Arroio	Arroio	Arroio	Arroio

Figure 2. Comparative analysis and organization of information for field activity in the office – attribute table.

It is important to point out that the office pre-field preparation is carried out by the same staff who does the field research, together with linguists that work only in the office. Doing office cultural research on the area has been stated by certifiers to be highly motivational to them, who claimed to feel they are "learning stuff", which reflects in their self esteem and involvement in the task. According to them, they do not perceive this learning when surveying for new mappings and updates.

Also, the joint effort of office and field personnel in the pre-field preparation provides a very profitable integration of the two phases of the collection, since certifiers are able to fully understand the office demands and vice-versa. Not surprisingly, this understanding has an extremely positive effect in the quality of information obtained in the field.

2.3. Collection of geographical names in the field

The field work follows the general procedures recommended in the UN-GEGN *Manual for the National Standardization of Geographical Names* regarding selection and number of informants and dynamics and registration of interviews. However, in the certification the field information review is done every two days, in the researchers' lodging, instead of in the end of the work. After every two days of field work, there is one day of meetings of surveyors and supervisor(s).

First, names of features that extend over areas covered by different teams of certifiers are checked for consistency; and problems, difficulties and special cases are reported to the supervisors, who take the suitable decisions. This allows problems to be solved on the spot, which is especially important when they require collection of additional information.

Regarding interviews with informants, it is worth noticing that the interviews in the certification may be quite long, since they aim at obtaining the most information possible on present and historical allonyms, etymology, history and motivation and meaning of the names researched. Therefore, there is no minimum or maximum duration of an interview. The time dedicated to it will be determined by the quality of the information provided.

Besides the interviews, it is also possible to obtain invaluable sources of information on geographical names in the field, in the archives of churches, schools, local museums, memorials, etc., such as the document in *Figure 3* below.



Figure 3. Sample of document used in the field: collection of cards prepared by members of the local community with information on the churches and the localities where they lie.

The photos in *Figures 4 and 5* below show the surveyors in action:



Figure 4. Interviews during field work.



Figure 5. Certifiers' lodging and transportation in difficult working conditions.

3. Conclusion and Further development

The testimony of the certifiers that the work developed did actually heighten the interest and engagement in the subject of geographical names comes to prove, even before the dissemination of the results of the certification process carried out, that by promoting the involvement with and knowledge on the subject, the geographical names and the cultural heritage of which they are part will be understood as highly important and worth preserving.

It's been also perceived that the incorporation of some procedures of the collection for certification may improve the survey for mappings and updates.

Furthermore, it is expected that the dissemination of the information generated at the end of a certification process will meet the demands of the society concerning geographical names and issues related to them.

Finally, with the dissemination of the method of certification, we seek to provide those interested in carrying out research on geographical names and their linguistic, historical and cultural aspects with a set of practices to guide their work.

References

- CORRÊA R.L.A. (2003) Geografia Cultural e o Urbano. In: CORRÊA, R.L.A. e ROZENDAHL, Z. (eds.). Introdução a Geografia Cultural. Bertrand, Brazil, pp. 167-187.
- Manual for the National Standardization of Geographical Names (2006). United Nations publication, Sales No. E.06.XVII.7, New York.
- SEEMANN, J. (2005) A toponímia como construção histórico-cultural. *Vivência*, 29: pp. 207-224.

Exploring the use of GIS tools in the analysis of geographical names

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Abstract. The research and analysis of geographical names, for many times, is accomplished in qualitative form, aiming the construction of gazetteers or inventories containing some information about names of interest. However, quantification and analysis of distribution of sets of geographical names from specific characteristics, such as: cultural origin, toponymic motivation, date of nomination, among others, are still not systematically carried out. This kind of study is also very important because it can aid in identifying spatial toponymic patterns and in the comprehension of how the nomination process occurred. In this sense, this paper aims to highlight how as the use of GIS tools can improve the analysis of geographical names. In particular, the application of the Kernel method, which consists in a statistical density estimation method, will be presented. The study area chosen for the application of this statistical method was the city of Petrópolis, located in the mountains of the State of Rio de Janeiro, Brazil. This city has an interesting history linked to the Brazilian Imperial Family, which built there its summer palace in mid-nineteenth century. In this project, were employed, majority, German immigrants who founded a colony there. This characteristic of the city was strongly translated in geographical names present in it at the time of its founding in 1845, and in the following decades. However, from the nineteenth century to the current days, Petrópolis grown a lot influenced by other social and economic situations that were not related to the Imperial Family or the arrival of new contingents of German immigrants. In this sense, the Kernel method was applied in order to verify how the current geographical names are distributed according to their cultural origin. Thus, allowing the identification of spatial toponymic patterns that show where, in the current total set of Petrópolis' geographical names, German names still exist. The analysis of this aspect, in this case, leads to reflection on the evolution of the spatial organization of the city and the stay of traces of German culture in the region, in addition to emphasizing the potential use of GIS tools to the theme of geographical names.

Keywords. Geographical names, GIS, Kernel method, Petrópolis

1. Introduction

The research and analysis of geographical names, for long time has been accomplished in qualitative form, aiming the construction of gazetteers or inventories containing some information about names of interest. However, quantification and analysis of distribution of sets of geographical names from specific characteristics, such as: cultural origin, toponymic motivation, date of nomination, among others, are still not systematically carried out. This kind of study is also very important because can aid in identifying spatial toponymic patterns and in the comprehension of how the nomination process occurred. In this sense, this paper aims to highlight how as the use of GIS tools can improve the analysis of geographical names. In particular, the application of the Kernel method, which consists in a statistical density estimation method, will be presented.

2. Maps showing the population according to mother tongue

The use of geoprocessing for the processing and analysis of geographical names is the main discussion brought by this paper. In this context, it should present the following definition adopted here:

“According to Câmara, Davis and Monteiro (2001), the term geoprocessing denotes the discipline of knowledge that uses mathematical and computational techniques for the treatment of geographic information. Xavier da Silva (2000), prioritizing the implementation of the digital GIS, defines it as a set of computational techniques that operate, on georeferenced databases, to turn them into relevant information with analysis, synthesis and reformulations of these data, making them usable in an automatic processing system.” (Menezes and Fernandes, 2013, p. 203)

Therefore, geographical names can also be understood as a set of geospatial information subject to analysis and representation through the various tools used in geoprocessing. To do this, however, it is necessary to manipulate these geospatial information into a Geographic Information System (GIS) in the digital environment, understood as:

“The GIS are an analytical tool for handling information spatially referenced and they make possible the manipulation of various sources such as field surveys, records, maps and remote sensing. (...).

We assume the GIS as a geoprocessing geotechnology able to work with the large volume and complexity of data required in integrative studies, in addition to allowing the manipulation of geographical information stored in it.” (Menezes and Fernandes, 2013, p. 207)

2.1. The Kernel Method

In this article it was chosen to explore the Kernel method for the analysis of geographical names. This statistic tool consists in an estimative of density in a given event in a given area from a pattern of dots. The resulting map of this process helps to analyze complex patterns of dots with no loss of information, as state Beato and Assunção (2008, p. 31). The authors also say that you can quickly identify hotspots, either by visual inspection, based on the statistical significance, and also examine changes in patterns of dots over time.

3. The case of the city of Petrópolis

Petrópolis is a city located in the mountain region of the state of Rio de Janeiro, Brazil, and the history of its creation is deeply linked to the Imperial Court's plans in the XIX century.



Figure 1. Map of Petrópolis.

The city was built from a project to build a summer palace for the Imperial Family, so they could stay up there in the summer season, in search of a milder weather than the one of Rio de Janeiro, center of the Empire.

The construction of the palace was also linked to a settlement plan for some historical circumstances, among them the presence of the German Major Julio Frederico Koeler, engineer who coordinated all the urban plan, that relied mainly on immigrant labor coming from the region where today it is known as Germany. This characteristic of the city was strongly translated in geographical names present in it at the time of its founding in 1845, and in the following decades.

However, from the nineteenth century to the current days, Petrópolis grown a lot influenced by others social and economic situations that were not related to the Imperial Family or the arrival of new contingents of German immigrants. In this sense, the Kernel method was applied in order to verify how the current geographical names are distributed according to their cultural origin. Thus, allowing the identification of spatial toponymic patterns that show where, in the current total set of Petrópolis' geographical names, German names still exist. The analysis of this aspect, in this case, leads to reflection on the evolution of the spatial organization of the city and the stay of traces of German culture in the region, in addition to emphasizing the potential use of GIS tools to the issue of geographical names.

To carry out the Kernel method, the set of geographical names present in municipal base map at 1:10,000 was used. It was produced in 1999 by the Prospec company in response to the demand from Petrópolis' City Hall.

4. Results

The application of the Kernel method was made from hydrographic names and road categories present in the spatial area defined to the analysis. This spatial area refers to the area with a radius of 10 km from the center of the historical plants of the city of Petrópolis, namely the Plant Koeler¹ and the Plant Taunay².

The following maps show the results from the application of the Kernel method.

¹ It is a historic plan dated back to 1846, elaborated by Major Koeler and portraying the initial spatial organization of the city.

² It is a historic plan dated back to 1861, elaborated by Major Taunay that shows the traces of the city's first expansions.

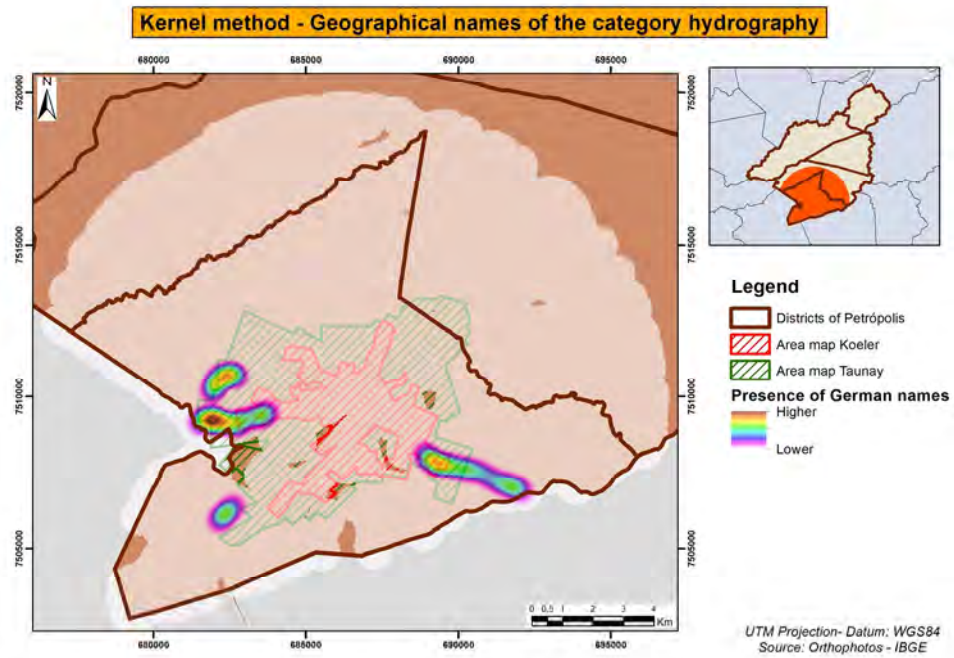


Figure 2. Kernel method applied to geographical names of hydrography.

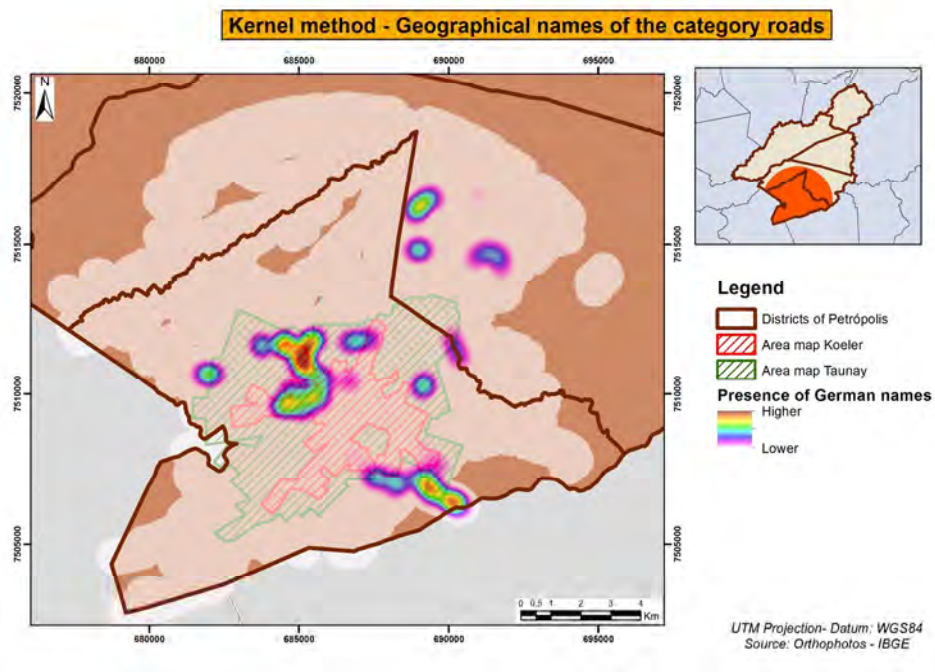


Figure 3. Kernel method applied to geographical names of roads.

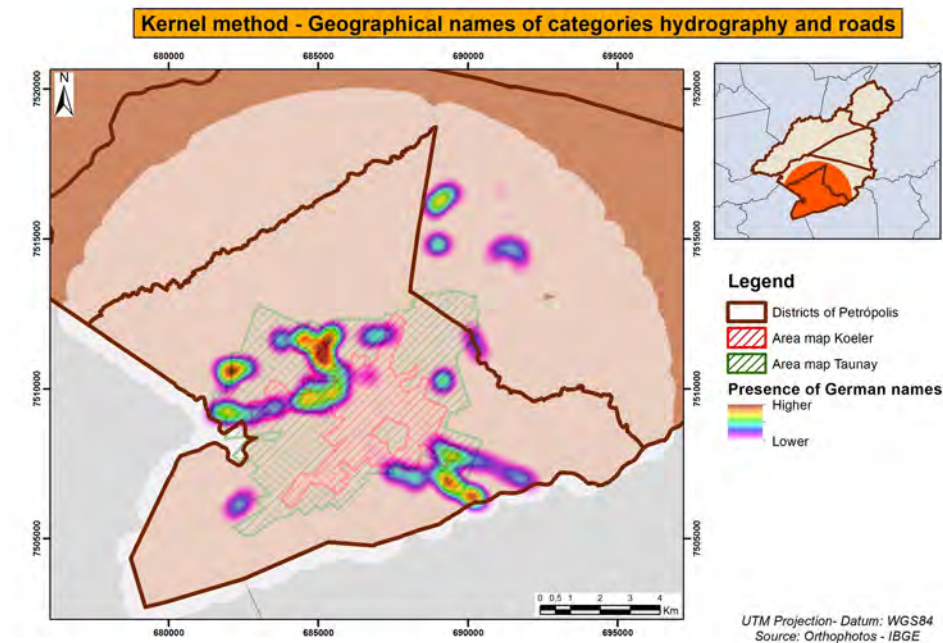


Figure 4. Kernel method applied to the entire set of geographical names analyzed.

It is possible to see that the application of this tool allows to identify toponymic spatial patterns. These patterns describe that German geographical names occur more often in roads than in hydrographic features. In the case of roads, it was even found that German names are more dispersed throughout the city space, with the occurrence in areas beyond the boundary of the first district.

A full analysis of all evaluated toponyms still shows that German names are now focused on what corresponds to the northwest and southeast areas of the historical plants

5. Conclusion

The results presented here show the huge potential that the application of GIS tools have regarding the analysis of geographical names. The Kernel method, specifically, allows the spatial distribution of geographical names, from a characteristic of interest, to be viewed in a very clear and informative way. It allows them to be designed, which were called here toponymic spatial patterns.

Therefore, in general, it can be said that the display of information obtained through the geographical names achieved through methods such as this, consists in a great facilitator for the interpretations.

It is considered very important, in this sense, that the exploitation of other existing tools in the geotechnology field that were already enshrined in environmental analysis, for example, can contribute substantially to the analysis of geographical names.

References

- BEATO, Cláudio; ASSUNCAO, Renato. Sistemas de Informação Georreferenciados em Segurança. In: Beato, Cláudio (ed.). Compreendendo e Avaliando Projetos de Segurança Pública. Editora da UFMG, Belo Horizonte, 2008.
- DICK, Maria Vicentina de Paula do Amaral. Origens históricas da toponímia brasileira: os nomes transplantados. Revista do Instituto de Estudos Brasileiros. Brasil, n. 24, p. 75-96, 1982. <http://www.revistas.usp.br/rieb/article/view/69706>. Accessed 29/08/2013.
- FROÊS, Carlos Oliveira. Petrópolis - A Saga De Um Caminho. Petrópolis: Instituto Histórico de Petrópolis, 2006. <http://www.ihp.org.br/site/ixcof.htm>. Accessed 15/04/2014.
- _____. Detalhes interessantes sobre o plano de Koeler. Petrópolis: Instituto Histórico de Petrópolis, 2002. http://www.ihp.org.br/lib_ihp/docs/cof20020311.htm. Accessed 30/04/2014.
- GUERRA, Rogerio F. Os alemães no Brasil: expedições científicas, colonização e herança intelectual. Revista de Ciências Humanas, v. 46, n.1, p.11-81. UFSC, Santa Catarina. 2012.
- IBGE – Instituto Brasileiro de Geografia e Estatística. Cidades@. <http://www.cidades.ibge.gov.br/xtras/home.php>. Accessed 11/03/2014.
- MENEZES, P. M. L., FERNANDES, M. C. .Roteiro de Cartografia. 1. ed. São Paulo: Oficina de Textos, 2013. v. 1. 288p.

Reinventing Brazilian Cartography: The Brazilian Institute of Geography and Statistics (1938-1968)

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Abstract. This paper analyses the science of cartography at the Brazilian Institute of Geography and Statistics (IBGE) from 1938 to 1968. Even though the institutional acronym does not contain a “C” for cartography, cartographic activities were undertaken at the institute, mainly through cartographic surveys, geodetic works, and production of several kinds of maps at different scales. As a starting point for this research project, three enterprises of this Institute that can be considered fundamental for the understanding of territorial knowledge and mapping of Brazil during the analyzed period are examined: the Campaign for Municipal Maps, the updating of the Geographic Map of Brazil on a scale of 1:1 million, and the geographical expeditions organized in order to provide better knowledge concerning Brazilian territory (when related to cartographic issues and composed by technicians that work in the field of cartography). By analyzing these activities, this paper aims to shed light on the civil cartography officially undertaken in Brazil, which receives little attention from researchers in spite of its wide importance. In the 1960s, IBGE finally concluded the Geographic Map of Brazil on a scale of one to one million, which was a substitute for the Celebrative Map for the Centennial of Brazilian Independence, created by the Engineering Club of Rio de Janeiro. In order to do so, IBGE has intensely interacted with civil and military agencies, mainly the Geographical Service of the Brazilian Army, and demanded technical advisory of foreign institutions and professionals, especially American ones. Therefore, international and inter-institutional cooperation in cartographic activities at IBGE is a privileged subject of the research project to which this paper is related.

Keywords. Cartography, International Scientific Relations, Territorial Knowledge

1. Introduction

This project aims to study cartographic activities undertaken at the Brazilian Institute of Geography and Statistics (IBGE) from 1938 to 1968. Although it is publicly known that the Institute has always had the production of maps among its duties, cartography is not clearly identified among the different geographical, demographical and statistical activities which are carried out within its institutional scope. An example that supports such statement is the fact that academic works concerning IBGE (Almeida 2000, Penha 1993, Senra, 2008) have focused their investigation only on statistics and on geography. Regarding such aspect, the main guideline that leads this research is based on the following question: what is the place of cartography at IBGE?

By analyzing an organizational chart contained in Eli Penha's work about IBGE (1993), it was possible to find a graphic representation that firstly presents IBGE as an institutional organ directly subordinated to the Presidency of the Republic. From this institutional chart, it was possible to obtain the first hints by finding the word "cartography" related to Permanent Commissions, which were supported by technical advisors who belonged to the National Council of Geography. However, when it comes to the Executive Organizational Board (Federative collaboration), it is possible to find the Service of Geography and Cartography, legally established through the Law Decree no 6828 of August 25th 1944, and the Military Geographical Service as well.

In order to point out how my previous research trajectory relates to this new research stage, it is important to stress that the 1930s, which is my starting point, have also been adopted as the time frame limit for my Master's degree dissertation, entitled "*A map for the Republic: the Commission for the General Map of Brazil (1903/1932)*", which focused on military attempts at mapping Brazilian territory. Such an effort was carried out by the Commission for the General Map of Brazil, which started its activities in 1903, in the state of Rio Grande do Sul, a state whose mapping was regarded by the Army as urgent, since it was located in the border area. Nevertheless, this project, which was endorsed by widely recognized institutions and scientists at the time, has faced several obstacles, since it was slowly implemented. According to some experts, mapping methodology chosen for the project was inadequate to Brazilian continental dimensions.

Even though civil engineer Francisco Bhering¹, for instance, had recognized the project's scientific quality, he estimated that the complete mapping of Brazil would have been completed only after 220 years, if it followed the Commission instructions.

Mapping activities had been undertaken in the South Region of Brazil for almost three decades, and were coordinated, even if not continuously, by widely recognized military men such as Augusto Tasso Frago², Alfredo Malan³ and Alípio di Primio⁴, as well as many others. It is worth stressing that during its existence, the Commission remained institutionally isolated, keeping a considerable absence of dialog with other institutions, both national and international ones. Even conferences concerning world cartographic conventions to be adopted in order to produce a World Map to the Millionth Scale, which took place in London in 1909 and in Paris in 1913, were totally ignored by the Commission.

2. Institutional counterpoints to the Commission for the General Map of Brazil

After a decade of work, and without achieving expected results, the Commission faced a hard challenge in 1915, when its main attribution, the national map, was transferred to the Ministry of Roads and Public Works, which adopted a project suggested by the Engineering Club and headed by Francisco Bhering. Civil engineers foresaw the chance of making a map soon enough so that it could be shown at the celebrations of the Brazilian Independence Centennial, which took place in 1922. By using compilations of previous maps, the Engineering Club managed to present a Geographic

¹ Francisco Bhering was an engineer from Minas Gerais, who graduated at the Polytechnic School of Rio de Janeiro (*Escola Politécnica do Rio de Janeiro*). He was also a member of both the Engineering Club and the Society of Geography.

² Augusto Tasso Fragoso was a Brazilian military officer who became the head of government during the Provisional Government in Brazil in 1930. During the transition from 19th to 20th century, Tasso Fragoso wrote an article for the *Army Review*, in which he emphasized the need of mapping Brazil and the importance of creating a Brazilian geographical service.

³ Alfredo Malan was one of the spokesmen of the Commission for the General Map of Brazil. He periodically wrote for a military journal published in the State of Rio Grande do Sul by military personnel who supported the permanence of works by the Commission.

⁴ Even though Alípio de Primo had taken part at the Commission for the General Map of Brazil, he achieved notorious recognition in the 1930s, when headed the direction of the Geographical Service of the Brazilian Army.

Map in the Exposition of the Centenary of Independence. That map was considered the first scientific Map of Brazil. Later on, as I show in this paper, that map would be criticized by IBGE (Bernardino 2013).

Apart from the Engineering Club, another cartographic agency in military forces institutional scope itself has acted as a critical counterpoint to the Commission for the General Map of Brazil: the Military Geographical Service (SGM). Major Alfredo Vidal, who was the main enthusiast of the latter, envisioned unifying cartographic activities undertaken at the Army. By doing so, it followed a trend that was already taking place in some European countries. In addition, the Military Geographical Service has introduced technical advancements in Brazil, such as the stereo-photogrammetry, which offered three-dimensional representations of terrain through photographic images that were taken from different positions. This method was known for its rapidity and its ability to add altimetry to the cartographic surveys, which had been basically planimetric to that point. This resulted in more controversies concerning the triangulation activities⁵ undertaken in the south of Brazil.

The Geographical Service of the Brazilian Army used the journal "*A Defesa Nacional*" in order to accuse the Commission for the General Map of Brazil of being obsolete and inadequate. That was possible once they could rely on contacts with Major Vidal at the Prefecture of the Federal District, as well as with the General Military Staff and Carl Zeiss, a German company which manufactured optical instruments, known in Brazil as "Casa Zeiss". A new institution was set in the Conceição Fortress, located in Rio de Janeiro. After consecutive efforts, it was possible to acquire modern equipment and bring a group of engineer-geographers and technicians from the Military Geographical Institute of Vienna to Brazil, as a consequence of the defeat of the Austro-Hungarian Empire during the First World War. The mission usually called "Austrian Mission", lead by baron Arthur von Hubl and in which other ten professionals took part, arrived in Brazil on 14 October 1920. The aim of the mission was to make Brazilian engineer-geographers acquainted with stereo-photogrammetric techniques mastered by Austrians. Throughout the 1920s and in the early 1930s, the SGM won some recognition by introducing aerial photography in their cartographic work

⁵ In order to figure how such geodetic method is conducted, it is worth pointing out that it deals with measurement of three angles of a triangle, at a field, with theodolites. According to instructions of this method, these triangles' sides must have tens of kilometers in length. As a result of it, it is only possible to select points in high locations which offer a dominant view of large areas. Those high locations are usually hard to access. Besides, this method faces obstacles in flat areas (Barreto & Castiglione 2014).

(Peregrino 1967) and expanding the scope of its activities to the field of military instruction, through the founding of a School of Geographer-Engineers.

In 1932, after several crises that surrounded its last years of existence, the Commission for the General Map of Brazil was incorporated into the Military Geographical Service, what resulted in the creation of the Geographical Service of the Brazilian Army (*Serviço Geográfico do Exército*). It is worth stressing that, since the beginning of the 20th century, Alfredo Vidal exchanged correspondence with the “Casa Zeiss” company. Therefore, continued to use stereo-photogrammetry, which was totally related to the instruments of measuring related to this method. The presence of Austrians in Brazil, as well as cooperation with Brazilian military men concerning such techniques, established SGE as a point of reference to stereo-photogrammetry in Brazil⁶.

It is important to point out that the trajectory of the Geographical Service of the Brazilian Army has always been intertwined with the trajectory of cartography at IBGE. An example of such correlation is advisory offered by members of the Geographical Service of the Brazilian Army in works directly related to the use of aerial photography in cartographic measurements – which was, as pointed out before, a cartographic technique with Austrian-German standards. A second example of correlation is the transfer of the Chairman Djalma Poli Coelho to the Presidency of IBGE (Senra 2008), a quite polemic fact at the time.

3. National Institutes and the founding of IBGE

In 1931, Mario Augusto Teixeira de Freitas⁷, who headed the General Directorate of Statistics of the Ministry of Education and Health proposed a project which aimed at creating the National Institute of Statistics and Cartography (*Instituto Nacional de Estatística e Cartografia*) at the Ministry of Education. However, the Commission of the Ministry considered this inopportune. Instead of including cartography among the duties of an institution committed with statistics, that Commission presented a project of crea-

⁶ In 2013, by analyzing the Library of the 5th Section of the Geographical Service of the Brazilian Army, the author already had a chance to ascertain to which extent German and Austrian influences have been relevant.

⁷ Mario Augusto Teixeira de Freitas (1890-1956) was General Director of Information, Statistics and Dissemination at the Ministry of Education and Public Health. Between 1936 and 1948 he planned and consolidated Brazilian statistics activities as the Secretary General of the National Council of Statistics, an organ that was part of IBGE.

tion of the National Statistical Institute (INE), which was consolidated through the Decree 24.609 of July 6th 1934 (Conselho Nacional de Geografia 1939). In spite of this, according to Teixeira de Freitas, cartography and statistics were intertwined, what became evident when INE itself has claimed, in its first national convention, the need of creating physical and political maps of the territory of the each state, which should present municipalities and districts territorial divisions (Santos & Castiglione 2014).

Due to such demand, José Carlos de Macedo Soares, who was the Minister of Foreign Relations at the time, has noted that it was essential that Brazil joined an international community for cartographic science, a fact that was totally ignored by the military cartography in its attempt to produce a national map. Under those circumstances, correspondence by Professor Pierre Deffontaines⁸ was received. Deffontaines expected that Brazil joined the International Geographical Union. Undoubtedly, such a fact was relevant to the process of creating the National Council of Geography (*CNG Conselho Nacional de Geografia*). The project of founding of CNG was elaborated through a series of meetings, which took place at the Itamaraty Palace. Many widely recognized Brazilian professionals from the field of geography attended those meetings. Therefore, on 24 March 1937, Decree no. 1527 was passed, through which the Brazilian Council of Geography was incorporated into the National Statistical Institute, a fact that made it possible for Brazil to join the International Geographical Union.

The founding of IBGE cannot be mentioned without considering its meaning in the scope of the New State (*Estado Novo*). Regarding this aspect, Eli Penha's work makes us reflect upon the concept of an institute as a tool to reinforce the nation state of Brazil (1993). According to Penha's point of view, Enali de Biaggi asserts that the production of maps by IBGE constituted one of the main ways through which such modern State was consolidated, since IBGE contributed to produce the fatherland picture from a unique center, replacing political decisions for technical solutions (De Biaggi 2000).

In a recent article, as pointed out before by cartographers Barreto dos Santos and Castiglione (2014), the cartography at IBGE was born *in the cradle of statistics*. Following such direction, it was possible to analyze a cartographic campaign which was directly subordinated to the census of 1940. Due to the need of that census, cartography became one of the institute's strong aims. Hence some projects became priorities, such as the review of the calculation of the area of Brazil, the creation of a campaign to measure geographical coordinates of municipalities, the production of regional and

⁸ Pierre Deffontaines (1894-1978) was a French geographer, mainly known for his work in Brazil, Spain and Canada.

municipal maps and the updating of the Map of Brazil on the scale of one to one million (Gomes 2010).

The campaign of municipal maps is one of the main lines of research connected to this current project, especially because such movement resulted in the National Exhibition of Municipal Maps, which took place in Rio de Janeiro in 1940. Then President Getúlio Vargas established criteria through which a municipal district would lose its political autonomy in case it did not make its own territorial mapping together with a technical memoir and photographs of geographical and urban aspects within a one-year deadline (Gomes 2010).

Concerning the Geographical Expeditions undertaken by IBGE during the 1940s and in 1960, Vera Lúcia Abrantes (2000, 2013) analyzed iconographic data available at the Center of Documentation and Spreading of Information (CDDI). Abrantes has also worked with oral statements of professionals who have worked at IBGE. In her research, Abrantes aimed to rescue institutional memory. However, this research granted her a wide understanding of the geographic expeditions commanded by IBGE, as well as the knowledge to which extent those incursions through Brazil can be explored as a research object.

This research intends to stress the relation between the enterprises discussed above and the cartographic tasks carried out by IBGE, at a time when terrestrial surveys were still of uttermost importance to solve doubts concerning the exact location of points or division lines and to establish geodesic reference marks which were needed to create future maps. Therefore, many expeditions can be taken as investigation elements, such as the expedition at the São Francisco river basin (1950), which had among its main objectives studies concerning Geomorphology, Human Geography and Cartography and in which Francis Ruellan, Edgar Kuhlmann, Carlos de Castro Botelho, Maria Francisca Cavalcanti, Marietta Mandarino Barcello and Maria Emília de Castro Botelho took part. The author intends to examine those expeditions not as objects themselves, but as practices motivated and guided by cartographic objectives, which had extreme importance in a historical period of the scientific work at IBGE. An additional aim is to understand how scientists from other countries took part in those expeditions.

One of the most cited and recognized works is a thesis by Roberto Schmidt Almeida, entitled *"A Geografia e os geógrafos do IBGE no período 1938-1998"* (2000). By examining those sixty years of institutional history and emphasizing geographers, as the title itself suggests, Almeida has mainly used oral history as a source for his research, and presents transcriptions in his thesis. However, the section of his work which better relates to this current research is the one in which the author discusses international influences on the geographical activities of IBGE. Almeida asserts that the

methodological and technical standards mainly originating from French, German and Anglo-Saxon schools have influenced the activities carried out by IBGE.

However, historian Patrícia Aranha asserts that the main standards for Geography as practiced at IBGE were the Anglo-Saxon ones. Her arguments are based on the fact that in Rio de Janeiro geographers found a more similar disciplinarian model. As contact with Europeans became harder during the Second World War, the connection between Brazil and the United States became closer. Therefore, many Brazilian geographers went to American universities, and American professionals came to Brazil (Aranha 2014). Therefore, the American geographical model became a standard at IBGE. Similarly to America, Brazil intended to rise as a nation, and the geographical strategies were similar, as it can be demonstrated by the Brazilian conquest of the West frontier.

Reasserting Aranha's hypothesis, the relationship between United States and Brazil was not different in the field of cartography. An example of this relationship is the fact that Professor Alirio Hugueney de Mattos⁹ went to the United States in 1944 on a six-month internship. He was invited by the U.S. Coast and Geodetic Survey due to the relations that the Brazilian Geography Council kept with technical institutions and authorities from United States. Those relations were established following the objective of developing geographical activities in Brazil.

Nevertheless, it is interesting to notice that the Geographical Service of the Brazilian Army was directly related to the cartography made at IBGE, since this Service provided consultancy to IBGE. Photogrammetry, brought by Austrians, had not been spread in the field of civil cartography. Therefore, a dependence relationship remained for years. Apart from practical works, components of the Geographical Service of the Brazilian Army also offered aerial photogrammetry courses at IBGE.

Besides, in what concerns Brazilian pioneering movements towards the West frontier, it seems that the Geographical Service of the Brazilian Army has indeed impelled the directions of cartography at IBGE. The main objective, according to the general secretary, would be providing references to public government in order to improve decision making in what concerned pioneering occupation of the West Frontier, creating a plan with three main enterprises: creation of municipal maps, cartographic standardization and the Geographic Map of Brazil on a scale of 1:1 million.

⁹ Alirio Hugueney de Mattos is considered one of the IBGE pioneers. He was consultant of IBGE and had worked at the National Council of Geography as the director of the Division of Cartography. Besides, he collaborated with IBGE enterprises related to his knowledge field.

Since the mapping had to make considerable progress, the council was intensively dedicated to making the map. It was therefore decided that a campaign for gathering coordinates should be started, with two main objectives: the first one was the enlargement of the network of astronomically and exactly determined points, and the second one was acquisition of geographical reference elements that would allow the use of municipal maps that prefectures were preparing until the end of 60s. That process meant the advantageous use of 1572 pieces of cartographic material.

4. Final considerations

Even though IBGE had acquired a significant institutional structure due to its connection to the New State guidelines, it did not centralize all the tasks related to the production of the Geographical Map of Brazil. Instead of doing so, mapping activities were carried out in a cooperation regime through which certain tasks were delegated to other institutions.

Therefore, the first step in a research concerning cartography at IBGE is to understand that those activities are not only a part of statistical science, but also provide a source of information both statistics and geography. As a consequence, questions concerning the mapping of Brazil could be analyzed from that conjecture. By highlighting to which extent activities carried out at IBGE were intertwined with different institutional branches, it is possible to examine Brazilian cartography in all its complexity.

References

- Instituto Brasileiro de Geografia e Estatística – IBGE (2012). Atlas Geográfico Escolar, 6ª Edição. IBGE, Diretoria de Geociências, Rio de Janeiro.
- Abrantes VL (2013) O arquivo fotográfico do Instituto Brasileiro de Geografia e Estatística e o olhar de Tibor Jablonszky sobre o trabalho feminino. *História, Ciências, Saúde. Manguinhos*. v.20, n.1, jan.mar.
- Abrantes VL (2000) Fragmentos de memória das pesquisas geográficas de campo no IBGE (1939-1968): imagens e representações numa abordagem da história oral. Rio de Janeiro. Dissertation of Master's degree in Social Memory. Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro.
- Almeida RS (2000) A Geografia e os geógrafos do IBGE no período 1938- 1998. Doctorate Thesis. Rio Universidade Federal do Rio de Janeiro, Rio de Janeiro.
- Aranha P (2014) «O IBGE e a consolidação da geografia universitária brasileira», *Terra Brasilis* (Nova Série) [Online], 3, <http://terrabrasilis.revues.org/971>; doi: 10.4000/terrabrasilis.97
- Bernardino MGA (2013) Um mapa para a República: a Comissão da Carta Geral do Brasil (1903-1932). Dissertation of Master's degree in History of Science and Health. Fundação Oswaldo Cruz, Casa de Oswaldo Cruz, Rio de Janeiro.

- Crawford E (1992) *Nationalism and internationalism in science, 1880-1930*. Cambridge University Press, Cambridge.
- De Biaggi EM (2006) *La cartographie et les representations du territoire au Brésil*. Thèse (Doctorat en Géographie, Aménagement et Urbanisme). Université de Paris III, Institut des Hautes Études de l'Amérique Latine, Paris.
- Gomes AMC (2010) A exposição nacional de mapas municipais, 1940: a encenação nacionalista da imagem cartográfica. 3º Simpósio Iberoamericano de História da Cartografia: Agendas para História da Cartografia Iberoamericana, São Paulo.
- Hilton SE (1977) *O Brasil e a crise internacional 1930-1945*. Civilização Brasileira, Rio de Janeiro.
- McCann Jr. FD (1973). *The Brazilian American alliance: 1937-1945*. Princeton University Press, Princeton.
- Milza P (2007) *As Relações Internacionais de 1918 a 1939*. Edições 70, Lisbon.
- Penha EA (1993) *A Criação do IBGE no Contexto da Centralização Política do Estado Novo*. Centro de Documentação e Disseminação de Informações, IBGE, Rio de Janeiro.
- Peregrino U (1967) *História e projeção das Instituições Culturais do Exército*. Rio de Janeiro, Livraria José Olympio Editora.
- Santos CJB Castiglione LHG (2014) A atuação do IBGE na evolução da cartografia civil no Brasil. *Terra Brasilis* (Nova Série) [Online], 3 | 2014, <http://terrabrasilis.revues.org/942> doi: 10.4000/terrabrasilis.942 Accessed 31 October 2014
- Senra N (2008) *História das Estatísticas Brasileiras: estatísticas organizadas (1936-1972)*. IBGE, Centro de Documentação e Divulgação de Informações, Rio de Janeiro.
- Seitenfus RAS (1985) *O Brasil de Getúlio Vargas e a formação dos blocos: 1930-1942 – o processo do envolvimento brasileiro na II Guerra Mundial*. Companhia Editora Nacional, São Paulo.
- Schultz L (2000) *Estados Unidos: poder e submissão. Uma história da política norteamericana em relação à América Latina*. EDUSC, Bauru, São Paulo.
- Tota AP (2014) *O amigo Americano: Nelson Rockefeller e o Brasil*. Companhia das Letras, São Paulo.
- Tota AP (2000) *O Imperialismo sedutor: a americanização do Brasil na época da Segunda Guerra*. Companhia das Letras, São Paulo.

The New Map of Hereditary Captaincies of Brazil

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Abstract. This paper presents a new map of the Hereditary Captaincies at the moment of their creation (1534-1536), which differs from the traditional map proposed by Varnhagen in 1854. The new design is based on primary sources, namely, charts of donation and the cartography of the time, particularly the map by Bartolomeu Velho. The main changes refer to boundary lines in northern captaincies, which should follow under meridians and not parallels; they also refer the particular configuration of the southern captaincies, with lines pointing northwestwards; again to the division into portions, named *quinhões*, of the captaincies of Aires da Cunha and Joao de Barros; finally reference is made to the existence of undistributed lands.

Keywords. Hereditary Captaincies, Map of the Hereditary Captaincies, Historical Cartography

1. Introduction

In theory, the Hereditary Captaincy design process at the time of its creation (1534-1536) is relatively simple: identifying, on the Brazilian coast, the limits points between them and tracing the lines, always in accordance with the data and descriptions provided by the donation letters. In practice, difficulties emerged: the lack of some of these letters and mistakenly assuming that all the lines run to the west, which is not true.

The first complete map attempt of this geographical configuration was presented by Varnhagen in his *História do Brasil*¹, in its first edition (1854).

¹ In this paper, we cite the 5th edition: Francisco Adolfo de Varnhagen. *História geral do Brasil*, Ed. Melhoramentos, Sao Paulo, 1956, vol. I, but always confront it with the first edition of this volume, 1854, available in Coleção brasileira digital: <http://www.brasiliana.usp.br/node/454>.

Capistrano de Abreu² commented on this design: "Varnhagen clearly defined our knowledge of the donatories, that is, the beneficiaries: showed there were twelve of them, provided all their names, discovered the *foraes* and the donation letters of most of them, drew the boundaries of the captaincies and calculated their respective areas. The result of all these investigations was set succinctly as follows by the wise G. d'Avezac in *Considérations géographiques sur l'histoire du Brésil*, 30/31, Paris 1857 [freely translated from Portuguese]". And subsequently, Capistrano transcribes the description of the captaincy made by this French historian, coinciding with the classic map (Figure 1).

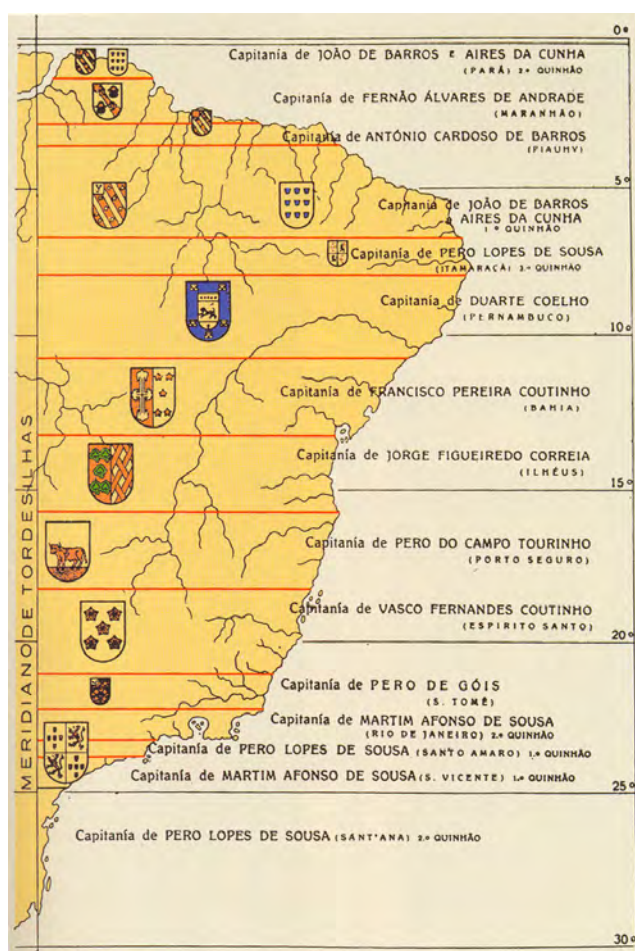


Figure 1. Map of the captaincies, apud Carlos Malheiro Dias.

² Prolegomena to Book II of *História do Brasil* by Frei Vicente do Salvador, p. 102, Melhoramentos, São Paulo, 1954.

Yet as will be shown, this reconstruction is wrong, and to advance in the study of the matter, we appealed to a more thorough reading of the primary sources: donation letters, other documents and maps of the time.

2. Donation letters and other documents

Table I lists the documents that have remained so far with the date each one was executed.

n	Donatory	Donation Letter	Foral	Other documents	Leagues
1	Aires da Cunha	<i>partial</i>	11/03/1535	18/06/1535	50+25
2	João de Barros	8/03/1535	11/03/1535		50+25
3	Fernando Álvares de Andrade				35
4	António Cardoso de Barros	19/11/1535	20/11/1535	13/09/1535	40
5	Duarte Coelho [Pereira]	10/03/1534	24/09/1534	25/09/1534	60
6	Francisco Pereira Coutinho	5/04/1534	26/08/1534	26/08/1534	50
7	Jorge de Figueiredo Correia		1/04/1535		50
8	Pedro do Campo Tourinho	27/05/1534	23/09/1534	7/10/1534	50
9	Vasco Fernandes Coutinho	1/06/1534	7/10/1534	25/09/1534	50
10	Pero de Góis [da Silveira]	28/01/1536	29/02/1536	10/03/1534	30
11	Martim Afonso de Sousa	20/01/1535	6/10/1534	28/09/1532	100
12	Pero Lopes de Sousa	21/01/1535	6/10/1534	28/09/1532	50+30

Table I. Legal documents of the Captaincy and dates of execution.

From the cartographic point of view, the *donation letters* are crucial since they indicate the limits and leagues of each territory.

The other documents are not as important for drawing the map. The *forais* (legal documents) indicate the total leagues conferred to the donatory, without specifying whether the territory is continuous or not. Among *other documents*, are the so-called memory *alvaras* that include a promise of donation, and exist for donatories 4 and 10, and a letter from the king to Martin Afonso, promising lands to him and to his brother. Also included are “apostilas”, which are additions, usually rectifying the donation letters of donatories 5, 6, 8 and 9.

There is another very important document, a letter granting the exploration of gold and silver, a joint document issued to the first three grantees (the so-called Letter of mining³). As will be seen, this document provides the limits and leagues assigned to those captains, correcting or adding 25 leagues to the first two and indicating 35 for the third. In this table, blank cells indicate that the text or copy of such documents is not available, as occurs for donatories 3 and 7.

To establish this table we employ the work by Chorão (1999)⁴, a researcher who carried out the paleographic transcription, a presentation and notes to documents kept in the Torre do Tombo in Lisbon. Some data and texts come from other sources: Martim Afonso de Sousa's and his brother's Letters of donation, come from the classical works by Pedro Taques⁵ and Frei Gaspar⁶; the Letter of mining and the Letter of donation to João de Barros are transcribed, even with small errors or gaps, in the introduction by Antonio Baiao to the known book *Ásia* regarding this donatory who was the chronicler of the Indies⁷ and also in the classic work by Malheiro Dias⁸.

³ Antonio Baiao, introduction to *Ásia*, by João de Barros, Coimbra, Imprensa da Universidade, 1932 (facsimile reprint in 1988, pp. XXVIII to XXXIX). Decisive stretch in the Torre do Tombo: CHR-L-1-2 1_c0151: ANTT, Chancelaria Régia, D. João III, Livro 21, folha 73.

⁴ Maria José Mexia Bigotte Chorão: *Doações e Forais das Capitanias do Brasil (1534-1536)*, Ed. of Instituto dos Arquivos Nacionais / Torre do Tombo, Lisbon, 1999.

⁵ Pedro Taques de Almeida Pais Leme, *História da Capitania de São Vicente* (original of 1772), Edições do Senado Federal, Brasília, 2004. Electronic version in <http://www.bibliotecavirtual.sp.gov.br/pdf/saopaulo-historiadacapitaniasaovicente.pdf>

⁶ Frei Gaspar da Madre de Deus, *Memórias para a História da Capitania de São Vicente* (original of 1797), Itatiaia-EDUSP, São Paulo, 1975. Since this edition contains errors in the key points defining captaincy limits, we directly consulted the text the 1st edition, available at Google books: <http://books.google.com.br/books>. In addition to a transcription in this book, the letter of donation to Pero Lopes was also published in *Documentos históricos da Biblioteca Nacional*, v. 13, 1929 (p. 136 and ss.) and v. 80, 1948 (p. 108 and ss.) and in *Provas de História Genealógica*, de António Caetano de Sousa, Lisbon, v. 6, n. 35.

⁷ Antonio Baião, o.c.

⁸ Carlos Malheiro Dias (coord.), *História da colonização portuguesa do Brasil*, Porto, Litografia nacional, 1921.

3. The limits and the design of the Captaincies

Table II shows the donatories; the captaincies/lots which correspond to the current Brazilian states; boundaries with neighboring captaincy to the west or to the south and the current place related to these border points. This table should be read in conjunction with the new design of the captaincies (*Figure 2*).

n	Donatories	Captancies	Leagues	Western or southern limit	Current Place / Interpretation
1A	Aires da Cunha	Maranhão1	50	Abra de Diogo Leite	Rio Turiaçú
2A	João de Barros	Maranhão2		<i>midpoint</i>	
3	Fernando Álvares de Andrade	Piauí	35	Cabo de Todos os Santos, east of Maranhao river	Ilha de Santana (west end)
4	Antônio Cardoso de Barros	Ceará	40	Rio da Cruz	Camocim
1B	Aires da Cunha	Rio Grande do Norte1	100	Angra dos Negros	Mucuripe
2B	João de Barros	Rio Grande do Norte2		<i>midpoint</i>	
	Ponto mais ao sul			Baia de Traição	Baia de Traição
5	Duarte Coelho [Pereira]	<i>Pernambuco</i>	60	Rio da Santa Cruz	South channel of The Ilha de Itamaracá
6	Francisco Pereira Coutinho	<i>Bahia</i>	50	Rio de São Francisco	Rio de São Francisco
7	Jorge de Figueiredo Correia	<i>Ilhéus</i>	50	Ponta sul da baía de Todos os Santos	South of the baía de Todos os Santos
8	Pedro do Campo Tourinho	<i>Porto Seguro</i>	50	The end of the precedent plus 50 leagues	Rio Pardo
9	Vasco Fernandes Coutinho	<i>Espírito Santo</i>	50	The end of the precedent plus 50 leagues	Rio Mucuri
10	Pero de Góis [da Silveira]	<i>São Tomé</i>	30	Baixos dos Pargos	Rio Itapemirim

11A	Martim Afonso de Sousa	<i>São Vicente 1</i>	55	13 leagues north of Cabo Frio	Rio Macaé
12B	Pero Lopes de Sousa	<i>Santo Amaro</i>	10	Rio Curupacé / Curparê	Rio Juquiriquerê
11B	Martim Afonso de Sousa	<i>São Vicente 2</i>	45	Rio de São Vicente, north bar	Barra da Bertioga
12C	Pero Lopes de Sousa	<i>Santanatje</i>	40	12 leagues south of Ilha de Cananéia	Barra sul de Paranaguá
*	End of distributed lands			Land of Santa Ana at 28° 1/3	28° 1/3

Table II. Donatories, leagues and boundaries with neighboring captaincies.

These boundaries do not differ from those proposed by Varnhagen, but some points should be noted. First, they are included in the donation letters and in the letter of mining to the captaincies of the north, among which the letter of Fernando Alvares de Andrade is not available, and there is only a fragment of the letter of Aires da Cunha. In the southern captaincies, the absence of the letter of Jorge de Figueiredo Correia does not preclude the identification of the limits, since they are contained in the Letters of its neighbors.

A second point to highlight is that the distribution of land to the north was only made up to the *abra* (bay or gulf) of Diogo Leite. Thus, there are lands west / north of that point, that were not distributed by the Portuguese crown.

The dashed lines in the captaincies of Maranhao (50 leagues) and Rio Grande do Norte (100 leagues) refer to the fact that the king granted the donatories, by the Letter of mining, the possibility of making a division between them, provided they respected the total of 75 leagues each, and reported on the division made within 20 years. Due to historical mishaps, this division was not made nor informed and we thus proposed a division in batches going through the midpoint, but in dashed line.

As can be seen in this figure, not all lines run according to geographic parallels; thus consisting in the main difference with respect to the map by Varnhagen. The north lines run according to meridians and in the south there are northwest lines, creating two captaincies diverting from the band pattern: that of São Tomé, almost triangular in appearance and São Vicente 1, with a *sui generis* form.

In the south the borders of the first parcel of Martim Afonso de Sousa, who had good cartographic knowledge, run along lines that go northwest until it reaches a certain parallel and from there it runs towards the west. This can

be read on the Donation letter to Martim Afonso (limits north and south) and in the letter to his brother Pero Lopes de Sousa. It can however not be found in the letter of donation to Pero de Gois, which could theoretically lead to conflict if some border demarcation attempt had been made on the north line of that parcel.

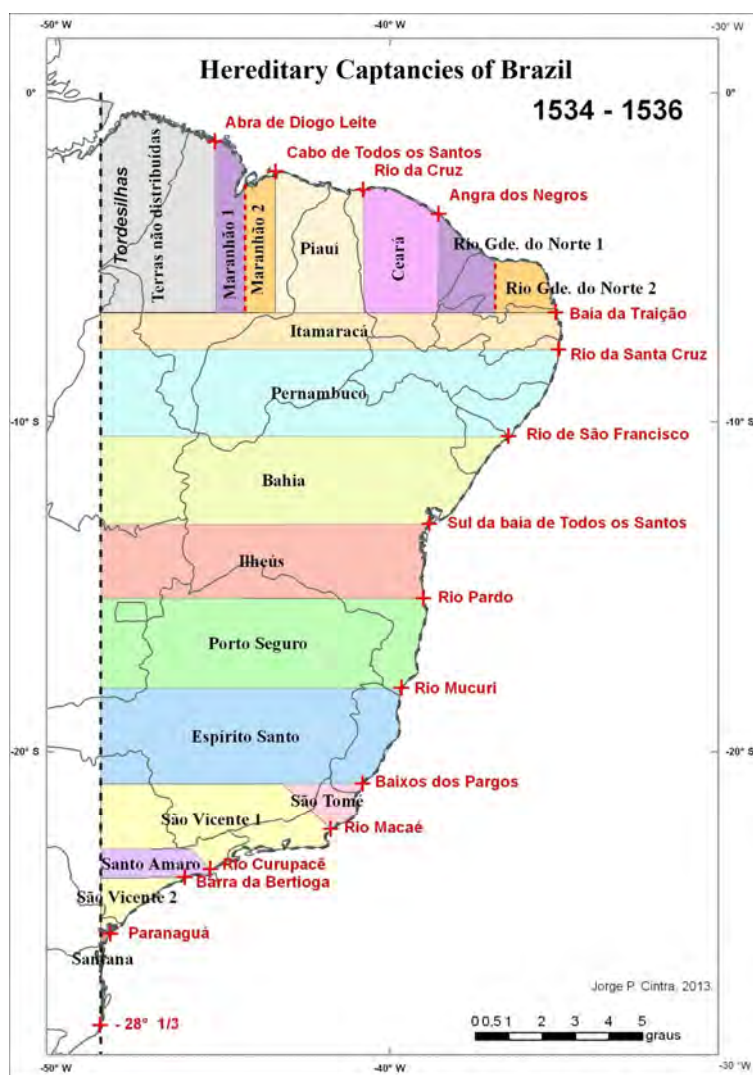


Figure 2. New map of the Hereditary Captancies.

The original text is clear; for the northern boundary one can read: [In the Rio Macaé] “a geographic milestone of my arms will be set, and a line will be drawn *in the northwest direction* up to twenty-one degrees high [latitude], and from this point, another line will be drawn, which directly comes to the west”. For the lower limit “and another geographic milestone will be

set on the north side of Rio Curupace, and a line will be drawn in the *same northwest direction* to the height [latitude] of twenty-three degrees, and from this point with will cross the line directly in the west". That is, the above underlined expressions show that the lines were not going directly to the west, but followed the path shown in *Figure 2*.

Varnhagen had access, read and cites the aforementioned works by Frei Gaspar da Madre de Deus and the one by Pedro Taques, which transcribe the donation letters; he even cites the captaincy border points, but he does not consider this northwest expression in describing its boundaries. In fact, Frei Gaspar himself did not give much importance to this expression. In one of his first works⁹, he did not carefully consider and transcribed instead of northwest. In the work we are using, he corrects the expression and correctly spells northwest, but this does not annul the consequences of that for the main problem dealt with herein: fixing the borders between the captaincies of Santo Amaro and the northern lot of São Vicente.

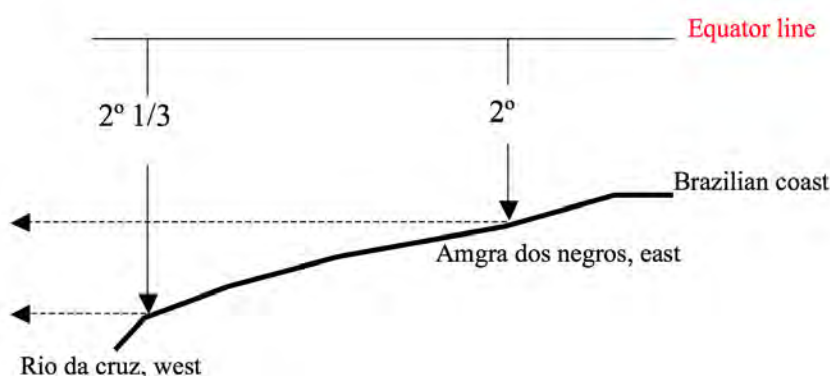


Figure 3. Scheme of the captaincy of Antonio Cardoso de Barros.

The northern borders, running according to the meridians are based on donation letters and maps. Thus, the letter of donation to Antonio Cardoso de Barros says: "The forty leagues which will extend and follow along the coast and enter the same width towards the hinterland and into the continent..." and complements adding that the extremes are *Amgra dos Negros* and the *Rio da Cruz*, in latitudes 2° and $2^\circ 1/3$, as shown in the scheme of *Figure 3*. This figure shows that if the estate lines ran to the west, the donatory would only have a piece of the sea, which is an absurd. The phrase "enter the hinterland" thus points to lines along meridians.

⁹ Frei Gaspar da Madre de Deus. Dissertação sobre as Capitanias de Santo Amaro e São Vicente [1780], autograph manuscript of BNL - National Library of Lisbon, COD 11,107 – F.R. 1284. Edition: Patrícia Simone Ferucio Manoel. Review: Priscilla Uvo Moraes.

The second argument comes from the donation letter to Joao de Barros, which reads as follows: “The leagues which will extend, and will follow along the coast and enter the same width as the hinterland and inland as far as possible, and if it is of my conquer, and not by me donated to another captain”. The latter expression, a conflict clause, only will be explained if the borders ran according to the meridians: if the lines borders of all the captaincies were parallel, there would be no possibility of conflict and this statement would be unnecessary. This clause indicates that this, and the other north captaincies, should be extended to the south, to the upper border of the Captaincy of Itamaracá, the last to have second parallel borders.



Figure 4. Bartolomeu Velho Map, 1561; original belonging to the Naval Museum of La Spezia, facsimile at the Itamaraty Library.



Figure 5. Ibidem, detail: the texts of the names of the donatories limited by geographical limits of their captaincies.

A third argument is verified in the map by Bartholomeu Velho (1561), reproduced in *Figure 4* and a detail in *Figure 5*. The fact that they are reduced in function of the page width, hinders the reading, but the Itamaraty Library facsimile can be clearly read, from west to east in separate blocks: capitania d aires da cunha / de j de baros / de fernan dalvz dandrade / de atº cardoso / de aires da cunha / de johão de barros / de pº lopes de sousa, etc. The names of the donatories, each in his own land, are limited according to vertical lines, not represented, but which break the texts when reaching these invisible boundaries. For example, the first title is written in three lines: capitania / d aires da / cunha.

4. Final considerations and conclusion

In addition to the arguments presented, the new configuration can be seen to make more sense: there are no captaincies with minimum width, as in the classical configuration, which also leads to minimum areas, for example, Martim Afonso, who was the one who received the most leagues along the coast.

Other studies, with the support of digital mapping and in further detail at some points can be found in Cintra (2013).

As shown above, we have been working as a counterpoint to the map proposed by Varnhagen (1956). To take a step further, it was necessary to make a more deep reading of the primary sources, which allowed suggesting several modifications to the current standard. A cartographic proposal was made to replace the model proposed over 150 years ago. More than completing a task, we hope to have contributed to opening new debates on the subject.

References

- Cintra, Jorge Pimentel. (2013). Reconstruindo o mapa das capitanias hereditárias. *Anais do Museu Paulista: História e Cultura Material*, 21(2), 11-45, available at <http://www.scielo.br/pdf/anaismp/v21n2/a02v21n2.pdf>.
- Francisco Adolfo de Varnhagen. (1956). *História geral do Brasil*, Ed. Melhoramentos, Sao Paulo, vol. I

The Historical Cartographic Collection in The Biblioteca Nacional do Brasil

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Abstract. The cartographic collection of the Biblioteca Nacional of Brazil was founded in 1810 following the transfer of the Royal Portuguese Court to the city of Rio de Janeiro. This collection grew and through the acquisitions of private, institutional cartographic documentation and from specialized bookstores, which today constitutes a rich heritage of world images. The major part of the subject refers to Brazil, Portugal and its domains, South America, and other areas of the world. This set of cartographic documents in the National Library dates from Classical Antiquity workers from 15th century onwards, when printing was first invented. There are manuscript, as well as printed atlases and maps by mapmakers from Europe and the Americas. Moreover, there is a map collection from the national geographical services of the some nations, dating from the 18th century. In addition, the National Library contains the publications of cartographic historians from the 19th century. Finally, the Biblioteca Nacional of Brazil has an important collection which shows the discoveries of new territories and the development of technologies through the ages.

Keywords. Historical cartographic collections, The National Library of Brazil collections, Rare maps and atlases

1. Introduction

The cartographic collection of the Biblioteca Nacional do Brasil (National Library of Brazil) was founded in 1810 following the transfer of the Royal Portuguese Court to the city of Rio de Janeiro, Brazil. This collection grew through the acquisitions of important private and institutional cartographic documents plus original documents from specialized bookstores, all of which today constitutes a rich heritage of world images in total or in parts. Also separated are some thousands of maps, views, charts, manuscripts and

prints. There are other historical documents in rare books or booklets besides hundreds of real and factious atlases, some rare and many are incomplete. This material is distributed throughout several divisions of the National Library: Cartography, Iconography, Manuscripts and Rare Books.

2. The cartographic collection

The set of cartographic documents in the National Library goes back as far as Classical Antiquity published from the 15th century on, when printing was first invented. The major part of the subject of the cartographic collection refers to Brazil, Portugal and its domains. It also has maps of South America from the De Angelis Collections, as well as maps of the boundaries of the countries adjacent to Brazil. Included are also maps of other areas of the world, which belonged to the royal family, private collectors and researchers who studied the history of cartography. In addition, the National Library contains the publications of map historians from the 19th century, such as Viscount Santarém, Nordenskiöld, Kunstmann, Wieder, Yussuf Kamal, Teixeira da Mota, the Cortesão brothers and so on.

2.1. Classical Antiquity

The National Library has the works of Greek astronomers, geographers and cosmographers/cartographers¹. The Greek scholars in cartography are Aristotle, with the book *Aristotelis de Coelo libri quatuor* by the interpretation of Francisco Vatablo and published in Lyon by Theobaldum Paganum, in 1559, the Geography by Strabo in seventeen books, with the editions from 1494, 1557, 1559, 1571, 1587, 1707 and 1807 (published by E Typographeo Clarendoniano, in Oxford) and Ptolemy. Ptolemy will be described later when his work “Geography” was rediscovered by the Western world. In Roman cartography, there is the itinerary published in a book entitled “Tabula itineraria Peutingeriana”, with facsimile maps with a study by Bayerische Akademie der Wissenschaften and a forward by Friedrich Thiersch, issued in Leipzig, 1824. Other prints from this time are e.g. *Bellum Catilinae* by Salustio, *Pharsalia* by Lucano, and *De chorographia* by Pomponius Mela.

2.2. The Middle Ages

During the Middle Ages, the Christian church influence was strong, mainly between the 4th and 15th centuries. The most common image represented

¹ Cartography is the word created by Viscount of Santarém, when he sent a letter to Francisco Adolfo Varhagen, in 1839. The word “cartographer” is used as a general term to refer to the cosmographers and geographers.

was the circle world maps, which is known as a *T-O Map*. It also included the 1483 edition of the *Etymologiae* by the Saint Isidore of Seville and it was published for the first time in 1472. Besides Isidore's, there are nine editions (1513-1585) of the medieval cartographer Sacro Bosco. Some Sacro Bosco's printings have decorated diagrams.

2.3. Modern History

Modern History, mainly the Renaissance, is a period which underwent great transformations of art, science and cartography such as the invention of printing, the rediscovery of Ptolemy's Geography and the overseas voyages, leading to the discoveries of new lands. Claudius Ptolemy was a Greek astronomer, geographer and mathematician, who worked at the Library of Alexandria. He wrote the major works titled "Geography" or "Cosmography" (a manual of producing maps with the Geographic Coordinates), *Almagest* (a treatise on astronomer), and *Tetrabiblos* (a compendium on astrology). The subject of this paper is Ptolemy's Geography, of his manuscripts composed in eight books, brought to Italy and introduced to the Continental West in the 14th century with a translation into Latin in 1406. Thrower (1999, p. 58) mentioned the Geography's manuscripts "reached Italy and by 1410 were translated into Latin in Florence" by Jacopo d'Angiolo². When the printing was invented in the middle of the 15th century, the book titled Geography was published in eight editions in Incunable³ (two issues without maps) and the 16th century there were several successive editions and added maps of newly discovered lands. The National Library has such editions: 1486 (Ulm, printer Johan Reger), 1508, 1513, 1520, 1522, 1533, 1535, 1545 (incomplete copy), 1548, 1552, 1561, 1562, 1564, 1573-1574, 1598, 1605 (two editions) and a facsimile printed in Paris in 1867. Also in the 16th century Cornelis Wytfliet published *Descriptionis Ptolemaicae Augmento*, which indicates New World' places not registered by Ptolemy. The library has 1597, 1598 and 1611 (incompleted) copies. Moraes (2010) considered this book as the first atlas of the Americas. There are also the *Theatrum orbis terrarum* by Ortelius from 1579 to 1612, in Latin (*Figure 1*) and the three issues in Spanish.

² The translation began by the Byzantine Scholar Chrysoloras and finished by his pupil Jacopo d'Angiolo.

³ Incunable is a book published from the beginning of the printing to 1500.



Figure 1. Theatrum orbis terrarum (Ortelius 1579), Latin edition.

From Portuguese cartography, the library has the factious atlas compiled by Abbot Diogo Barbosa Machado, which contains maps of Portugal and its overseas conquests. This volume contains engravings and manuscripts maps from the 16th to 18th centuries. The Portuguese map of Guimarães (c.1570) is the oldest and most important manuscript cartographic document known by Portuguese researchers, because it shows the plant of this city, which was the first capital of Portugal. Besides this, there are manuscript maps of Asian and African fortifications, maps of Malaca, Indonesia and Australia drawn by Manuel Godinho de Éredia or Héredia (*Figure 2*).



Figure 2. Map of Goa (Erédia, 1610).

Also in this collection, there are manuscript maps of Brazil and atlases by Portuguese cartographers, for example the family of Teixeira Albernaz.

There are few maps by the Italian mapmakers as Bertelli, Forlani, Gastaldi and Coronelli. The Dutch cartography dates from the end of 16th to 18th century, there are atlases made by Mercator and published by Hondius in both Latin and English; atlases by the Blaeu family, the oldest is *Appendix theatri A. Ortelii et Atlantis G. Mercatoris* made by Willem Janszoon Blaeu (Figure 3), as well as the *Geographia Blavianna* in Spanish.

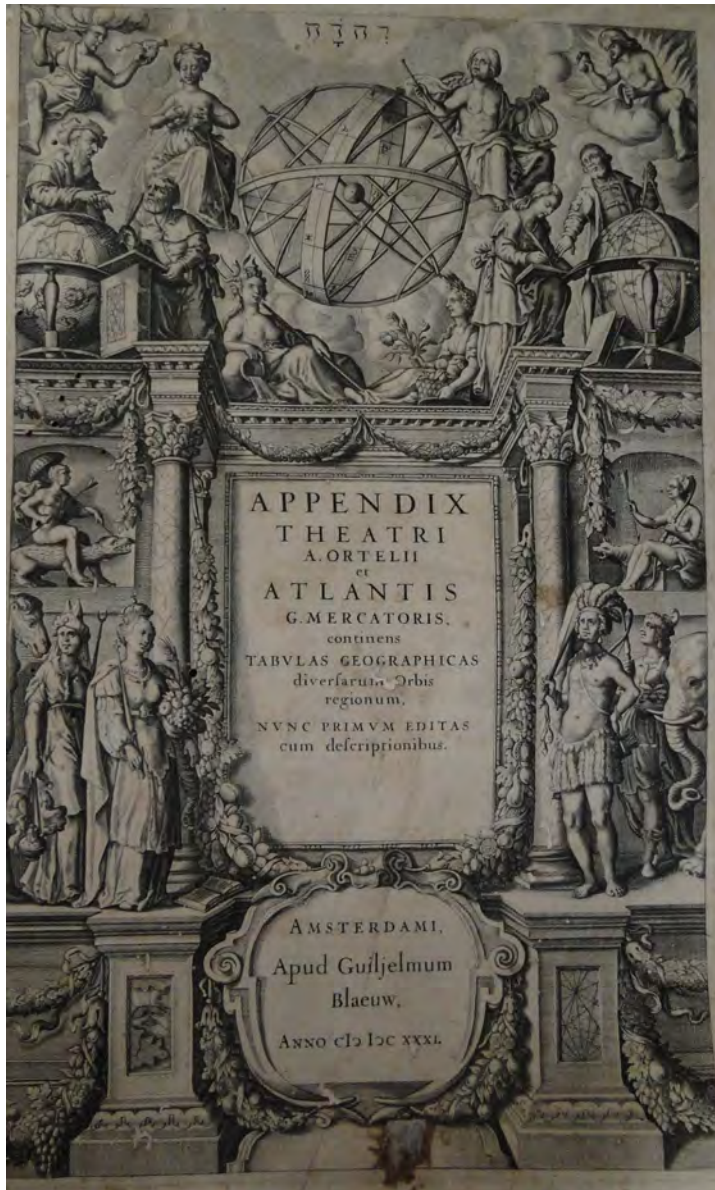


Figure 3. Appendix theatri (Blaeu, 1631).

There are also maps and atlases by Jansson, Mortier, Covens, Bertius etc, Doncker (father and son), Amongst the works from German Cartography, there is the *Cosmographia* by Peter Apian and a map which shows the voyage of Samuel Fritz down the Amazon River, published in Quito in 1707. The library further has an American atlas engraved amongst others by William Faden, with maps of the United States and Canada, printed by Robert Sayer and John Bennett at the end of the 18th century (*Figure 4*).

use of new instruments could measure the earth's surface with great precision. A famous French cartographer who lived in this period is Jean Baptiste Bouguignon d'Anville. He was considered the foremost geographer in Europe, by researchers in his time. There are some maps made by d'Anville and a factious atlas compiled by him in three volumes with the title *Atlas ou recueil de cartes geographiques*. This book was requested by D. João V, king of Portugal, through D. Luís da Cunha. From the mid-18th century, the great powers began to be interested in mapping their territories and founded mapping institutions. The atlas *Le Neptune françois, ou Recueil des cartes marines* by Bellin and printed by Department de la Marine, 1773 is also available in the library, as are maps and atlases by Depot de La Guerre from the 19th century, the Hydrographic Office and Geological Survey of the United States of America from the 19th and 20th centuries, as well as from Hydrographic Office of the United Kingdom of Great Britain and Northern Ireland also from the 19th and 20th centuries.



Figure 5. Le Neptune François (Bellin. 1773).

In Brazil, the geographic institutions emerged with the transfer of the Portuguese court to Rio de Janeiro, as did amongst others the *Arquivo Militar* (currently *Arquivo Histórico do Exército*), the *Marinha do Brasil*, (currently *Diretoria de Hidrografia e Navegação*), the *Comissão Geográfica e Geológica de São Paulo* (currently *Comissão Geológica*), founded in 1886, and the *Instituto Brasileiro de Geografia e Estatística*, founded in 1936. The National Library prepared the exhibition of the history of the mapping of Brazil which depicts the expansion of the territory, the borders of the countries up to the final formation of the nation.



Figure 6. Map of Brazil from 1925. Scale 1:500,000.

3. Conclusion

This paper set out to demonstrate to the participants of the Pre-Conference Symposium on Atlases, Toponymy and the History of Cartography an important part of this rare collection showing the discoveries of new territories and the development of technologies through the centuries.

References

- Adonias, I (1993) Mapa. Odebrecht, Rio de Janeiro
- Bagrow, L (1964). History of cartography. Rev. and enl. by R.A. Skelton. C.A. Watts: London
- Guedes, MJ (2012) A cartografia impressa do Brasil: 1506-1922 : os 100 mapas mais influentes. Capivara, Rio de Janeiro
- Menezes, PML, Fernandes, MC (2013). Roteiro de cartografia. Oficina de Textos, São Paulo
- Moraes, RB (2010) Bibliographia Brasiliana. FAPESP, EDUSP: São Paulo
- Oliveira, C (1993) Curso de cartografia moderna. 2nd.ed. IBGE, Rio de Janeiro
- Robinson, Arthur H (1975) Mapmaking and map printing: the evolution of a working relationship. In: FIVE centuries of map printing. University Chicago Press
- Tooley's dictionary of mapmakers (1999-2004). Rev. ed., Map Collector Publications, Tring
- Thrower, NJW (1999) Maps & civilization: cartography in culture and society. 2nd. ed. Chicago: University of Chicago Press