

PRACTICAL IMAGE INTERPRETATION GUIDE BRAZIL GEOGRAPHY SUBJECTS

V. M. S. G. de Carvalho, C. B. M. Cruz, R. S. Barros, S. P. Rocha, V. S. Seabra, D. R. Batista
Geography Department, Rio de Janeiro Federal University (salomony, cmad) @igeo.ufrj.br

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ABSTRACT:

The purpose of this work is to provide Geography elementary and secondary school teachers with support material that stimulates and can be a starting point to the use of Remote Sensing (RS) products in classroom quotidian. It starts from the point that without a suitable support, the results of trying to introduce modern technologies in teaching are inexpressive, because it lacks familiarity and even specific knowledge of these technologies and of how they can be used. Nowadays, in a world distinguished by great and quick changes, the awareness of needing to adapt teaching practices to the information level to which pupils are submitted is a recognized factor. However, few efforts are being made to direct teachers in a more concrete way in searching new strategies. Seeking to achieve more effective results to introduce RS in education, it was chosen to develop the Practical Interpretation Guide, which intends to provide the teacher with a positive knowledge of this technology, using an easy language to non-experts, making the teacher understand the processes used in attaining images and interpreting them. In addition, it was also a goal to provide ways of using this material during school year, exploring all aspects related to several contents included in all Geography teaching cycles, according to the curriculum suggested by PCNs (Parâmetros Curriculares Nacionais, National Curricular Parameters), developed by MEC (Ministério da Educação e Cultura – Ministry of Education and Culture) in order to direct teaching-learning process.

1. INTRODUCTION

From 1998 and 1999, Education and Culture Ministry, MEC, started providing guidelines that could direct teaching–learning process towards new millennium challenges, in order to stimulate quality improvement in elementary and secondary schools in Brazil. These guidelines were assembled in publications known as PCNs, which were extensively disclosed in whole Brazilian school network. The publications emphasized the need to change, nevertheless, that was what the majority of the teachers acting in classrooms were already longing for, whereas it is not difficult to realize that information level to which pupils are used since the last decades of the last century is characterized by speediness and information reach that were never thought. The globalized world demands people more and more qualified and teaching practices do not follow these changes. The imposition of new necessities became a distressing search for new practices that could positively inspire learning quality. Although individual efforts may have been in a way successful, the reality is that in general the majority of teachers still searches for more effective practices, which are more suitable to successive changes and to the characteristic speediness of present society, what is, without the slightest doubt, very positive, especially if we consider the great difficulties Brazilian education still has to confront. By thinking about a real contribution, efforts were directed in order to produce a material that encourages teachers to use satellite images, which have already been extensively used in geographic research, in the classroom. Admitting that just making available RS products would not be enough, because they could develop resistance to be used due to lack of specific knowledge needed for the subject, it was chosen to create a manual including not only RS possible applications within Geography contents, but also a complete introduction about the subject, in a language easy to be assimilated by those who had never been in touch with this tool.

2. METHODOLOGY

The development of Practical Interpretation Guide was ruled by the concern about three basic items that are supposed to be

achieved:

- Provide an introduction related to RS more practical than technical, granting a privilege to real important information in order to reach an understanding level of how images are generated, processed, corrected, and so on, without missing the point through technical details, that in our option, would offer very little advantage to the designed purpose.
- Suggest themes in Geography contents and related sciences that may have potential to be analyzed through interpretation of orbit images and aerial photos, always ruled by the topics suggested by PCNs.
- Provide local work examples in order to make taught contents closer to pupil's reality.

Next, the principal factors considered when developing these three main items are presented.

2.1 Introduction to Remote Sensing

To compose this item, the conceptions considered really important to make the meaning of Remote Sensing understood were researched in available bibliography, concerning about adapting the language in a way it becomes easy to be understood by those who never used this tool. So, the use of a language close to colloquial was chosen, attempting the knowledge to be passed on almost interactively. This kind of easy language is used by technical long distance courses. Although it is not exactly the same circumstance, this kind of language improves assimilation level and stimulates individual learning. Another concern about this work was related to illustrations, which were intensively used, because we believe that they are a powerful way to help understand the covered subjects. The following subjects were chosen as basic to RS understanding:

- brief history about RS and current tendency;
- electromagnetic radiation concept;

- wavelength and energy-substance interaction ;
- electromagnetic spectrum;
- existent sensor types;
- concept of spectral, spatial and radiometric resolution;
- spectral behavior of targets;
- colorful compositions.

Besides the subjects related to RS, it was also added to the Guide a small lesson with some basic Cartography concepts, which are needed to understand the used maps and to interpret the images themselves. The following concepts were covered:

- representation models of earth;
- geographical coordinate reading;
- scale;
- distance and area measurement.

2.2 Great Geography Themes

This section, considered very important, will suggest themes where RS may be used to the teacher. In general, there is a tendency to point out RS use relevance in studying environment questions, where its importance is incontestable. However, this section tries to make evident several possible ways of using the potential represented by RS products, which should not be restricted only to physical aspects of a separate feature, such as vegetation or relief study in their main unities, because it would deplete the use, reducing it to some classes in Geography curriculum. The intention is to extend the use of images, expanding their potential also to the study of social aspects, which means the optimization of this use. So, it is guaranteed that images may be intensively used during school year, enriching the studied contents. The teacher needs to have a very wide vision of each one of the aspects that may be interpreted through images, in order to recognize the opportunities in which images can be used.

To achieve this maximum optimization goal, a strategy was created, where all use possibilities of the different contents proposed by PCNs divided in four sets of selected themes were presented. The following themes were defined as great groups: **Relief and Hydrography** (Figure 1a), **Vegetation** (Figure 1b), **Climate** (Figure 2) and **Rural/Urban Space** (Figure 3).

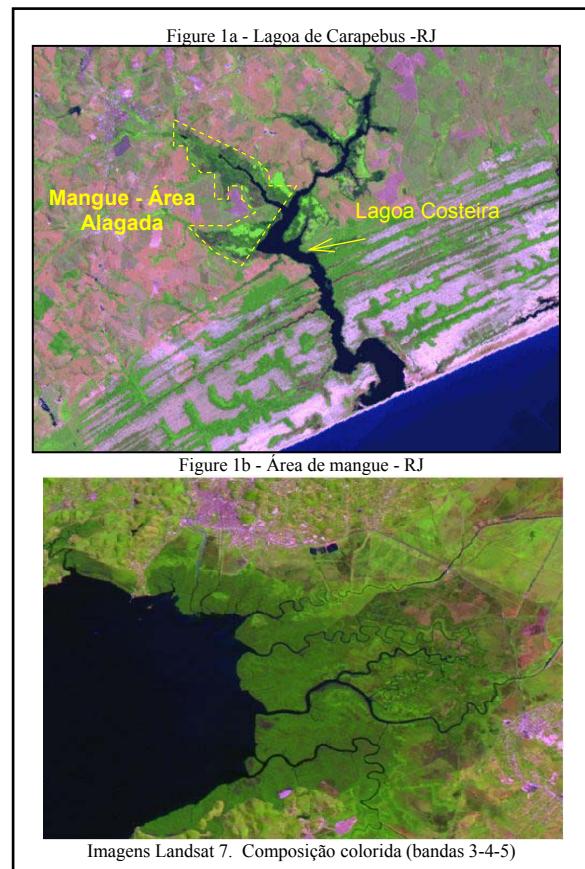


Figure 1

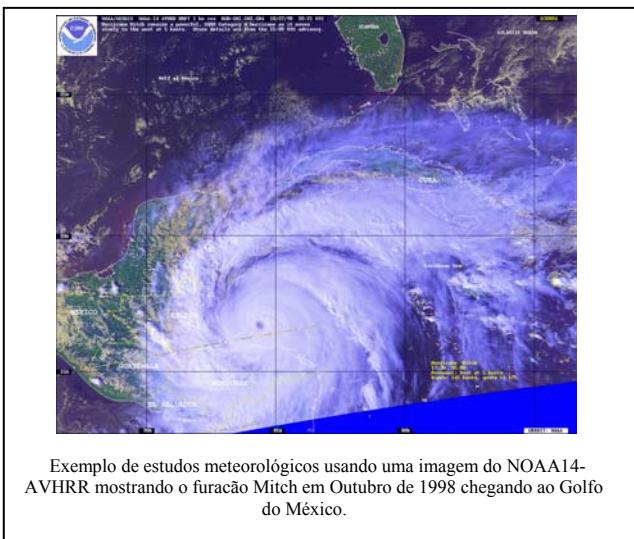


Figure 2

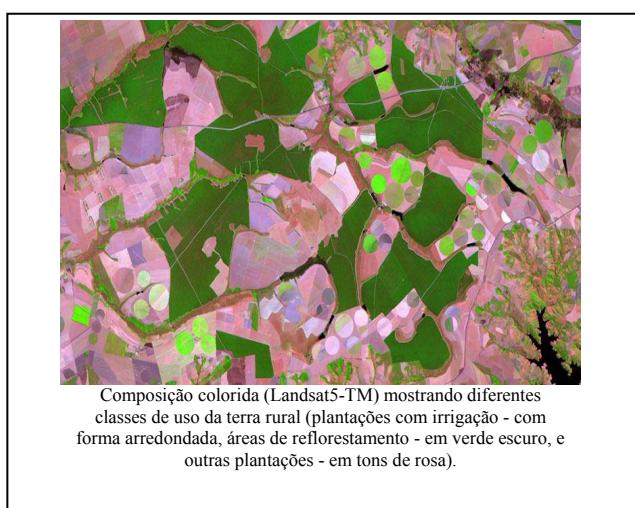


Figure 3

It was attempted to provide the same development standard to all themes, eventual differentiations were made just in relation to some details. In general, it was used a basic sequence to each theme. Their main aspects are described as follows.

2.2.1 Theme Resume: In this section, used to theme definition, general aspects are covered, such as its importance in Geography study and the context where it is used. It is also in evidence the multidisciplinary aspect of the covered theme. For instance, in vegetation matter, the distinguished ways of approaching in Biology or Sciences and Geography are focused.

2.2.2 Description of Classification Units: This item is meant to identify the main units in which the theme is classified (in Brazil, according to sources such as IBGE – Instituto Brasileiro de Geografia e Estatística, Brazilian Institute of Geography and Statistics; INPE – Instituto Nacional de Pesquisas Espaciais, National Institute of Spatial Research; among others). It features a brief description of each unit in order to outline the content through which the images will be interpreted.

All related units are presented in a thematic map in the same page.

2.2.3 Corresponding Thematic Map: Each theme is presented in a map using the scale 1:11,000,000, where the way distribution occurs in Brazilian territory can be observed. Beyond information related to the theme, the map shows political division of each state and their capitals localization. This thematic map is usually associated to the description of main units, and is also included in every page related to the theme in a reduced size, in order to provide spatial localization of the examples used in interpretation (figure 4).



Figure 4

2.2.4 Spectral Behavior: During the development of the item related to Remote Sensing, at the beginning of this Guide, it was obvious the need of building charts related to spectral behavior of some targets that compose the themes (vegetation, water, soil), where it was sought, through an efficient explanation, to clarify that each target had its own level of absorption of different radiation ranges. This care makes it possible to avoid a mechanical interpretation, without taking into account many differentiations that may happen, such as humidity level influence related to different year seasons. As this Guide seeks to supply elements so the teacher can act in an independent way, a wider understanding of such variations may provide the security the teacher needs to enterprise in other region images, offering a wide range of opportunities to make the classes richer. So, each theme shows a corresponding chart of spectral behavior and all necessary explanation to make it easy to be understood, always related to the images of different ranges and to a colorful composition.

2.2.5 Identification Standard: From the corresponding images of each classification units of the theme, the standard that can be best used to identify these units is selected, always with a box including all necessary explanations attached. Little transparent squares are used on the features that are to be highlighted in the image (figure 5), composing a legend with all characteristics of these features, stressing yet other uses or approaches presented in the images.

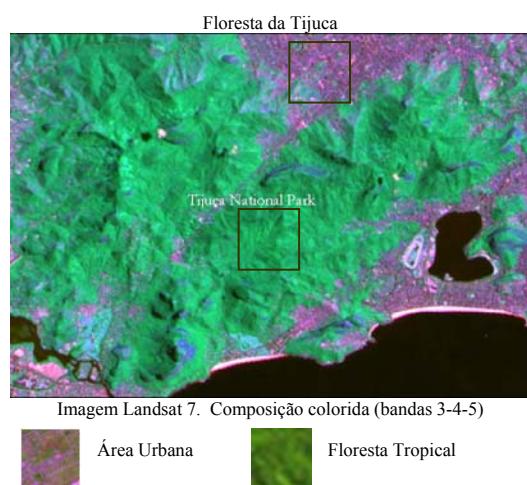


Figure 5



Figure 6

Tonalities, textures, forms, among others, are elements used in the examples, coming along with photos of the places identified in the images, whenever possible, and always related to the thematic map (figure 6).

This is the most functional way of establishing interpretation training. Moreover, there is a concern to show an expressive number of examples in order to achieve this goal.

2.2.6 Social Value of the Theme in Studying Other Geography Contents: This section is directed to discuss all anthropological aspects related to the theme. The importance of this item remains exactly in the possibility of using the images as a resource to help teaching process during all school year long, and also providing the optimization of these images, as mentioned before.

As an example, let's use vegetation, which may be present in urban area studies, when it deals with hillside occupation, comparing urbanization rhythm in risk areas to those areas that have not suffered anthropological impact, or in rural area study, stressing the gallery forest importance, or, furthermore, in geopolitical study, in debating Amazonia occupation, where the observation not only of the forest, but also of the localization of urban centers, communication channels and boundary extension are elements that may be observed by pupils, helping to a more positive idea of the involved questions. Other examples may be pointed out, such as observing hydrography in studies related to energy sources (figure 7); relief, in urban site discussions, climate, in study of heat island in big cities; and several other points that the teacher may find from the examples suggested in the Guide.

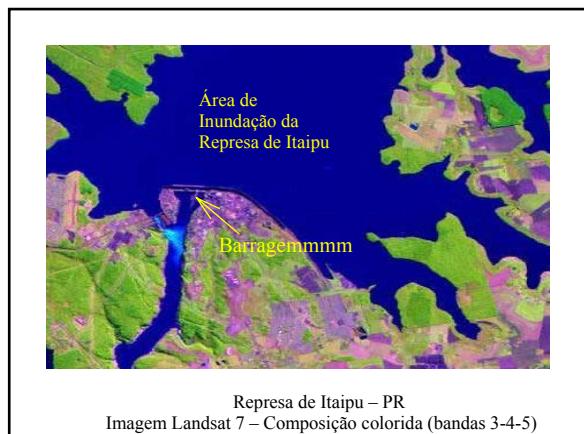


Figure 7

2.2.7 Case Study: In this section, an interpretation exercise is proposed, where an image and a white tracing paper overlay is provided. The teacher is guided step by step to perform an analysis of all aspects of the image, from marking reference points to developing his/her own thematic map. It is included the blank legend to be correctly filled by the teacher. This exercise always provides "tips" of how to proceed, for instance, to use clips to fix overlay. It is meant to make the teacher act with confidence when interpreting, exploring all aspects of the presented contents, including those related to cartography, such as the difference in a qualitative map, using colors to identify different kinds of occurrences, as well as the possibility of quantifying areas through squared paper. The Guide brings, to comparison, an overlay of the same area that has already been interpreted printed on A3-sized transparency, where explanations of all interpretations are provided. It is a way the teacher may check his/her performance, with tips to improvement, in case the performance is not satisfactory.

2.3 Local Level Example

As this Guide is intended to achieve national reach, that is, to be used by as many schools as possible and in all regions, local images samples presented in inserts are provided, or when it is not possible, inserts including a significant part of the region where the school is located, focusing the most expressive points in different Brazilian regions, as a way to make the reality experienced by the students of that school closer.

2.4 Suggested Pedagogical Strategies

At the end of each theme, there is a section suggesting pedagogical techniques that may be used in classroom. The emphasis is directed to suggestions of dynamics to be adopted and subjects that may be covered to use images, along with newspapers, magazines, books, inserts and different advertising, among others. This section also shows sites that provide free images and that may be accessed by the teacher to get new acquisitions to enrich the classes. Another emphasis provided is related to possibilities of interdisciplinary works, which should be constantly used, in accordance with PCN directions. It is also a concern that field works should be emphasized whenever it is possible, because they complement classwork dynamics and they are extremely efficient to increase pupils' observation ability, especially after using images in the classroom. This opportunity, if available, should not be neglected due to its great importance to an effective learning.

3. CONCLUSIONS

Image Interpretation Guide development was ruled by the desire of a group composed of professors and future teachers to implement positive changes in boring teaching-learning process. Although trying to create this material in an easy to understand language, it is undeniable that in many situations a kind of resistance in using it may happen. So, it is important to point out how essential it is to offer quick update courses and/or to qualify teachers in order to make them familiar with the use of this technology and its potential. To accomplish that, school support is essential, providing basic conditions and valorizing such initiative, because without this support these measures will become limited.

It is also important to point out the need to produce this material in large scale in order to reach indistinctively all Brazilian regions, even though it reinforces the need to create courses in farther places. In such cases, there may be investments in long

distance courses, which through modern communication media may accomplish the possibility of qualifying human resources from several regions, making them able to organize these courses, and then reaching places far away from big centers.

Next step to be implemented is to develop this material digitally, making it possible to improve quality, to provide more information (images, photos, tables, charts, etc.) and the last but not the least, to achieve an interactivity level that only electronic media can provide. This effort means to impress an advance to which schools are already being prepared, provided that we can find computers installed all over Brazilian territory, many of them still idle, and generally Internet connections are already available or close to that. It is scientific community duty to anticipate and be prepared to offer necessary support to make the changes effectively happen, and create efforts so they may occur through making available works that may contribute to that.

4. REFERENCES

Brasil. 1998. Parâmetros Curriculares Nacionais: Terceiro e Quarto Ciclos. *Geografia*. Ministério da Educação. Secretaria de Educação Fundamental. Brasília.

Brasil. 1999. Parâmetros Curriculares Nacionais: Ensino Médio. Ministério da Educação. Secretaria de Educação Média e Tecnológica. Brasília, 1999.