

ELABORATION OF THEMATIC MAPS OF GEOLOGY, GEOMORPHOLOGY, PEDOLOGY, VEGETATION AND LAND USE IN THE PEGMATITIC REGION OF THE MUNICIPALITY OF PARELHAS (RN), BRAZIL

Paulo Sérgio de R. Nascimento,
Reinaldo A. Petta,
Thomas Campos

Laboratory of Geomática-Department of Geology-UFRN
{paulo, petta, thomascampos}@geologia.ufrn.br

INTRODUCTION

The municipal district of Parelhas (State of Rio Grande do Norte - Brazil), hostsconcentrates the great portion part of the pegmatite occurrences of the Borborema Pegmatite Province of Borborema. However, the thematic cartography in the municipal district is scarce, mainly at in scales of 1:100000 or larger. In this context, it is imperative that the production and the storage of the geological information related to the Pegmatite Mines, mainly for the new projects, is beingthat has been developed in for this very important mineral region. The main objective of this study was the generation of thematic maps (geology, geomorphology, pedology, and vegetation and land use) and the organization in a geo-referenced GIS database, seeking to store, to consult, to available, to visualize, to manipulate, and to generate information onf the mining activities in the municipal district of Parelhas (RN). This comprehensivegenerated database will be used as a tool of technician-managerial subsidy for the appropriate management and operation of some projects of APL Pegmatite (FINEP/CNPq/MME/MCT), which that are being developed in this area of mineral activity; this, program seeksing the greatestlargest or broadest use of the

mineral resources, the prospectors' safety, and the minimization of the environmental impacts.

MATERIALS AND METHODS

The necessary materials for the development of this work were: topographic map of Jardim do Seridó (SB.24-Z-B-V), scale 1:100.000, Projection: UTM, Zone 24 (South), Datum SAD-69; orbital Image TM/Landsat-5, orbit/point 215/65, dated of 03/02/2008 2008, bands 1 to 5 and 7; and its computatcional geoprocessing program (Geo-referenced Processing Information System). The operationalizationization stages accomplished to reach the objective of this work involvedcorresponded: creation of georeferenced database georeferenced; restoration and registration of the Landsat image Landsat; contrast techniques, emphasis and treatment of satellite images; and compilation and creation of the thematic maps.

The database is characterized by an open system, where the information to be stored can be useful tofor other researches that use totally or partially, the same types of information. In additionBesides, new information can be inserted to complement those already in existencet or to accomplish other configurations that are done necessary. The first step, after defining the structure

of the data bank, is was the importing of the cartographic base, specifically, the drainage features (net)net and the hypsometry (with equidistance of 50 meters), already in the digital format;, they were imported directly into the geo-referenced database. SeveralSome edition adjustments were accomplished in some interrupted curves of level and without their altimetric values and the drainage net was actualized and completed with the TM images TM.

Before the registration of the images is accomplished with the cartographic base (topographic map of Jardim do Seridó), the images passed by the restoration procedure for the radiometric correction and increase of the sizes of the pixels for 10m for 10m, obtaining an enhanced image that and with the triples of the spatial resolution of the original images. This procedure was accomplished in a project without cartographic projection to guarantee that the same ones were not adulterated and then they were converted for the format GRIB, registered and, only after, inserted in geo-referenced database georeferenced. Using a In computatcional geoprocessing program, Geo-referenced Processing Information System, the images were transformed by PrincipleMain Components (PCA), that besides concentrating the information of all of the bands in PC1, it also possesses the largest variance (larger contrast) and medium more (larger shine). Besides, the compositions colored 4R5G3B and 5R4G3B were accomplished enhanced by lineal contrast.

The geology map was compiled and adapted fromof CPRM (2007), from the computer screenin the own screen of the computer, because its was found in the digital format. The pegmatite occurrences were then and inserted onto the pegmatite occurrences mapped during the field work. The geomorphology map was acquired from accomplished with base in the geo-

morphological base map geomorphological, in the digital format, at a in the scale of 1:1.000.000 fromof the Project RADAM-BRASIL Project, which was updated fromin the scale of 1:100.000 scale with base in the visual interpretation of the orbital images and for field work. The pedology map was derived from accomplished with base in the soils base map at of soils, in the scale of 1:1.000.000 scale from of the Project RADAMBRASIL Project and fromin the map of average recognition and high intensity of soils of a pilot area of the Nucleus of Desertification of Seridó, States of Rio Grande do Norte and of Paraíba (EMBRAPA, 2002), scale 1:100.000 scale, that it covered a portion of the area; this was used and with a base in the visual identification interpretation of the TM images TM and for field interpretation recognition.

The map of vegetable covering and land use was accomplished by the visual interpretation of images usingwith base in the photographic patterns and the digitization of the thematic classes was accomplished directly onin the computer screen of the computer. The interpretation of the images leaned mainly on these on in the systematic techniques, with no field visitsand in some map areas, so portions no visited in field, the interpretation is based on these key methods of the keys. It is important to emphasize that the legend of the classes was defined according to the nomenclature adopted by IBGE (1992), within the verifications in field at the detailed nd in the working scale.

RESULTS

RelyingLeaning oin conceptual and technological basies, an ambient computatcional model was configured that provided the storage of the cartographic information related to the Pegmatite mines in geo-referenced database geo-

referenced. Starting from the compiled and generated maps, it was possible to visualize the environmental physical-biotic of the area and link these to obtain a cartographic base for the area, that was non-existent before in the area. The result of the registration was considered satisfactory, because it obtained an accuracy of 0,3 pixel, precision and this is in agreement with the Pattern of Cartographic Accuracy Established Planimetric (BRAZIL, 1996). The maps generated are shown in the figures 1 to 4.

CONCLUSIONS

Concerning the development of this research, the obtained results allowed us to conclude that the objective of this work was reached: to compile, to generate, to organize, and to store in a single database (GDB), the spatial information of the municipal districts of Parelhas and Equador (Borborema Pegmatite Province - RN) and others regional districts, contributing to the formation of a cartographic base, at a in the scale of 1:100.000.

This generated database will be used as a tool of technician-managerial

subsidy for the appropriate operation of some projects of APL Pegmatite (FINEP/CNPq/MME/MCT) that are being developed in this area of mineral activity, seeking the most efficient use of the the endowed mineral resources, the prospectors' safety, and the minimization of the environmental impacts.

The generated maps (geology, geomorphology, pedology, vegetation and land use) made it possible to understand know with considerably greater detail the lithologic types, the relief forms, the soil classes, and the coverings of vegetation of the study area. It is important to point out that, starting from these generated maps, in a second processing stage using techniques of Geographical Information System, they were integrated automatically, for crossing referencings maps (denominated of algebras of maps). This integration made it possible to the generation of the maps of environmental vulnerability and natural vulnerability, that it will serve as critical support for environmental analyses, seeking to contribute the establishment in appropriate ways of the mining activities.

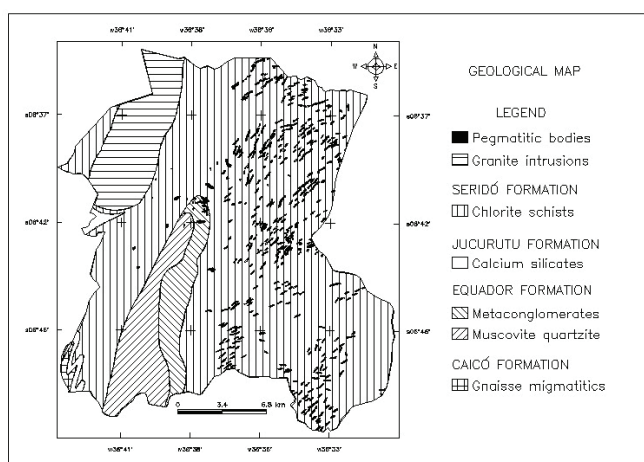


Figure 1. -Geological map of the municipal district of Parelhas (RN).

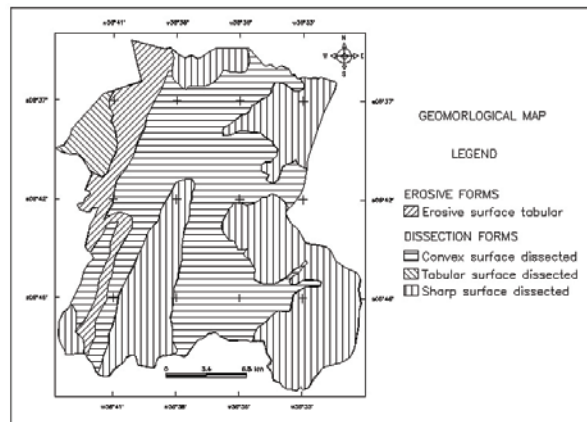


Figure 2.- Geomorphological map of the municipal district of Parelhas (RN).

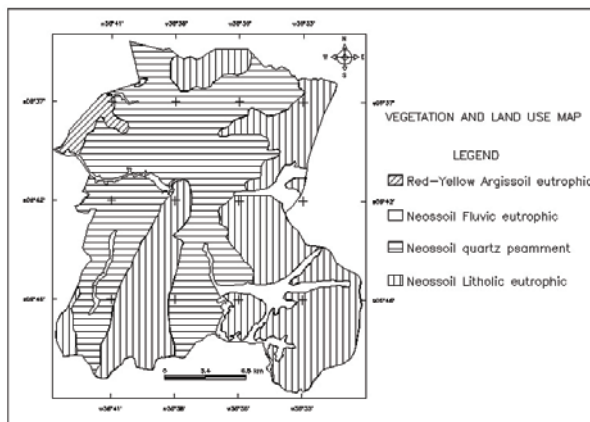


Figure 3.- Pedological map of the municipal district of Parelhas (RN).

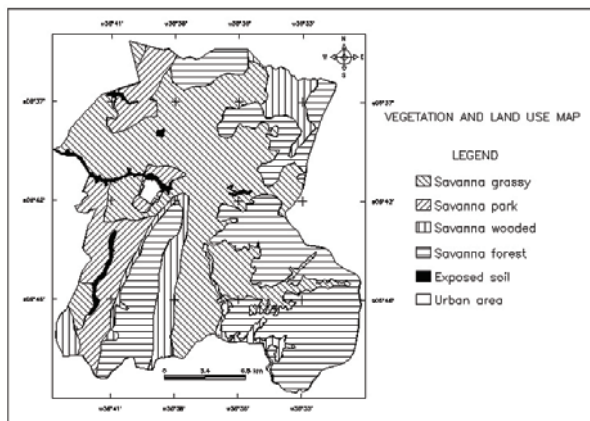


Figure 4- Vegetation and land use map of the municipal district of Parelhas (RN).

Acknowledgments

The authors of this work thank the following institutes: to CNPq (National Council of Scientific and Technological Development) and to FAPERN (Foundation of Help to the Researches of the State of Rio Grande do Norte) for the financial support; and to the Laboratory of Geomática of the Department of Geology of the Federal University of Rio Grande do Norte for the technological support.

REFERENCES

- BRASIL, Ministério da Ciência e Tecnologia e Comissão de Cartografia. Cartografia e aerolevantamento – legislação. Brasília, 1996., p. 26-27.
- CPRM - Companhia de Pesquisa de Recursos Minerais - Serviço Geológico do Brasil. Projeto CPRM - UFRN. Disponível em: <<http://www.cprm.gov.br/publique/cgi/cgilua.exe/sys/start.htm?infoid=100&sid=26>>. Acesso: 07. Ago., 2007.
- DNPM. Departamento Nacional de Pesquisas Minerais. Programa nacional de distritos mineiros. Recife: DNPM, 2002., 108 p.
- EMBRAPA. Empresa Brasileira de Pesquisa Agropecuária. Caracterização dos recursos naturais de uma área piloto do núcleo de desertificação do Seridó, estados do Rio Grande do Norte e da Paraíba. Rio de Janeiro: EMBRAPA, 2002. Disponível em: <www.uep.cnps.embrapa.br/publicacoes/bpd_04_caract_serido_2002.pdf>. Acesso em: 15. out. 2007.
- EMPARN - Empresa de Pesquisa Agropecuária do Rio Grande do Norte. Áreas de atuação. Disponível em: <<http://www.emparn.rn.gov.br>>. Acesso em: 1 out. 2007.
- IBGE – Fundação Instituto Brasileiro de Geografia e Estatística. Manual Técnico da Vegetação Brasileira (Manuais Técnicos de Geociências nº01). Rio de Janeiro: IBGE. 1992., 92p.