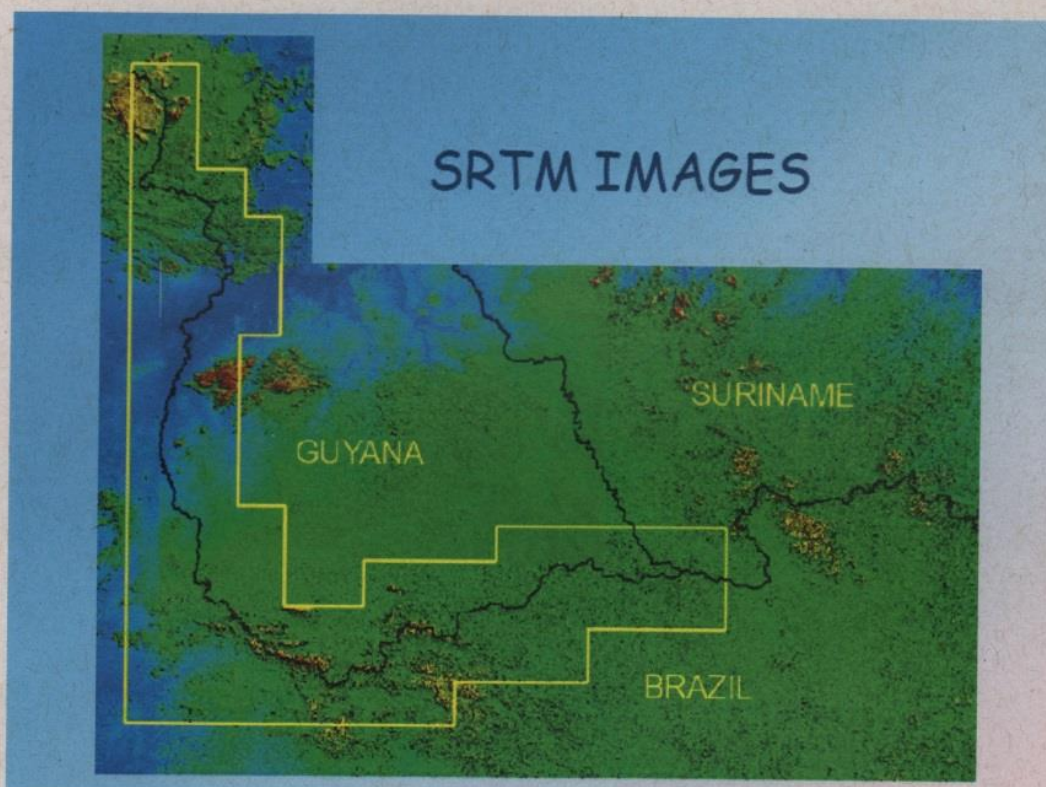


MINISTÉRIO DE MINAS E ENERGIA
SECRETARIA DE GEOLOGIA, MINERAÇÃO E
TRANSFORMAÇÃO MINERAL
CPRM – SERVIÇO GEOLÓGICO DO BRASIL



REPORT: MEETING HELD AT CPRM IN BELÉM, PARÁ, BRAZIL,
PROJECT GEOLOGICAL/GEODIVERSITY MAPPING ON
THE BRAZIL-GUYANA BORDER



FEBRUARY, 2011

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Terry Moore, GGMC, Georgetown, Guyana
Serge Nadeau, GGMC, Georgetown, Guyana

**MINUTES OF THE MEETING HELD AT CPRM IN BELÉM DO PARÁ,
BRAZIL, ON FEBRUARY 18 – 23, 2011, ON THE 1:1,000,000
GEOLOGICAL/GEODIVERSITY MAPPING ON THE BRAZIL-GUYANA
BORDER PROJECT**

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In the framework of the Geological Map of South America a meeting was held between representatives of Guyana and Brazil to carry out the ArcGIS training on the job, to improve the knowledge of Guyanese staff in the application of modern techniques for the 1:1,000,000 geological mapping of the Geological / Geodiversity Mapping on the Brazil-Guyana Border Project. A second meeting was held on February 23rd between representatives of Guyana and Brazil for the planning of the field work for the geological mapping of the border between Brazil and Guyana.

1) Training Course

The CPRM technicians, who presented the course were Luiz Fernando Rezzano Fernandes and Luis Fernando Barbosa de Almeida from the DIGEOP – Rio, and they gave a very useful and complete training course.

The training started on February 18, 2011, at 9:00 AM, at the main auditorium of the CPRM Pará Office. The Office's Superintendent, Dr. Manfredo Ximenez Ponte, opened the work accentuating the satisfaction with the presence of the Guyanese staff in Brazil. Following, he made a brief speech explaining the importance of the Joint Project, not

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only for the CPRM, but for the Brazilian Government. He explained that, mainly in the last eight years, one of the key actions of the Brazilian Government concerns the bilateral Cooperation Treaties and Projects with several countries around the world.

The main topics taught by the two CPRM technicians are summarized below:

- 1. Introduction to ArcGIS – ArcToolBox, ArcCatalog and ArcMap;**
- 2. Exploring the Interface of ArcGIS;**
- 3. Data Frame and Data Layer;**
- 4. Working with ArcMap;**
- 5. Overview of the Toolbars;**
- 6. Working with the Shapefile Attribute Table;**
- 7. Coordinates and Cartographic Projections and How to Define and Change them in ArcGIS;**
- 8. Applying Colors and Symbols to the Legend Entries;**
- 9. Working with Multiple Attributes;**
- 10. Creating and Editing Shapefiles;**
- 11. Using Some Geoprocessing Tools;**
- 12. Georeferencing an Image;**
- 13. Preparing a Layout for Printing and/or Publishing.**

The 5-day training, although based on CPRM basic GIS training, was customized in order to present real examples of the project area. Another concern during the training was to emphasize, at each correspondent subject, all the main points that were applied by the CPRM team in the preparation of the GIS Brazilian Project side of the border. This worry was justified since in the final phase of the Project, the GIS map produced by CPRM and the GIS map that will be produced by the Guyanese technicians will require the junction of the two maps in just one, correcting the features along the joint border line between the two maps.

The Guyanese staff, with this main guidance in mind, showed a prompt response during all the training, considering that in every example given it was stressed how to apply it to the GIS map production. Besides, this customization will allow a standardization of the maps, the Brazilian and the Guyanese, easing the work field that will be carried early by the two teams on the Guyanese side of the border.

The training was closed on 22 February, 2011, at 12:00 AM, in the presence of the CPRM Office Superintendent Dr. Manfredo Ximenez Ponte, and Dr. Maria Telma Lins Faraco, Dr. Evandro Klein and Dr. Lêda Maria Fraga, and the trainers of the course, Luiz Fernando Rezzano Fernandes and Luís Fernando Barbosa de Almeida. Concluding remarks were made by Dr. Manfredo Ximenez Ponte for the CPRM and by Dr Serge Nadeau for the GGMC organizations. Both representants mentioned the importance of this international geological project. The Guyanese representative thanked the CPRM members, ABC and the Government of Brazil for organizing the GIS training course. The members of the Guyanese delegation also indicated that they

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greatly appreciated the training course and the warm hospitality and friendship of the CPRM representatives.

Subsequently, in the afternoon of the same day after the end of the training course, the CPRM geologist Lêda Maria Fraga made a presentation showing a geological overview of the Guiana Shield area. She also presented illustration concerning the country rocks outcropping in the project area. This initiative is very important in the context of the Project, since it represents an integration and equalization of the geological knowledge of both teams.

2. Planning meeting

Closing this week of training, on February 22, 2011, a meeting at 9:00 AM and was composed of the Guyanese GGMC staff and the CPRM Coordinators of the Project, to plan the joint field work in the Brazil-Guyana mapping project area, that will take place the following month.

However, some technical problems were encountered and related to the flights of the Guyanese representatives and their per diem payments.

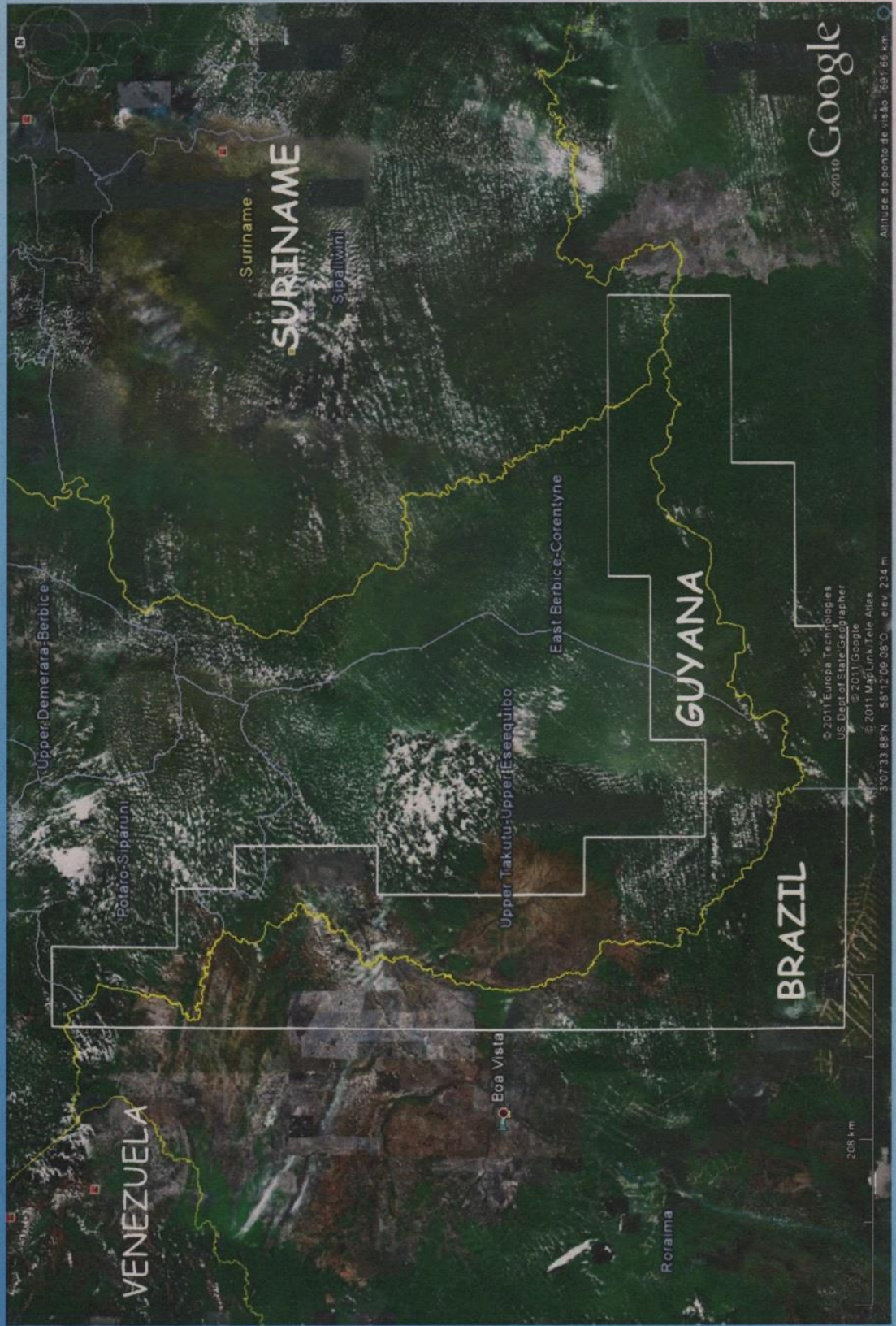
- 1) The flights booked by ABC and a Brazilian travel agency should have submitted the flights schedule to the Guyanese as the road selected by ABC and the Brazilian travel agency were not appropriate and complicated as it required to fly to Trinidad and then Suriname to reach Belem. In addition, this road required the Guyanese to sleep one night in Suriname on the way back to Trinidad and to Guyana and taking more than 2 days of travel. If the Brazilian flight company Meta had been selected the flights will have taken about 6 hours and occur on the same day of travel.
- 2) The per diem payment sent by ABC to CPRM Belem was sent late and did not reach Belem on time for the Guyanese to receive and used it while following the training course at CPRM Belem. Because of this delay the per diem will arrive after the Guyanese delegation had completed the training course and had returned to Guyana. Thus the per diem payment will have to be sent to Guyana due to the delay in the per diem to reach CPRM Belem on time.

It is recommended for more effective planning of flight travels and per diem payments of the Brazilian as well as the Guyanese delegations that their representatives being contacted and consulted in advance.

A meeting was also held on February 23rd between representatives of Guyana and Brazil for the planning of the field work for the geological mapping of the border between Brazil and Guyana and the Geological / Geodiversity Map of South America at the scale 1:1 000 000.

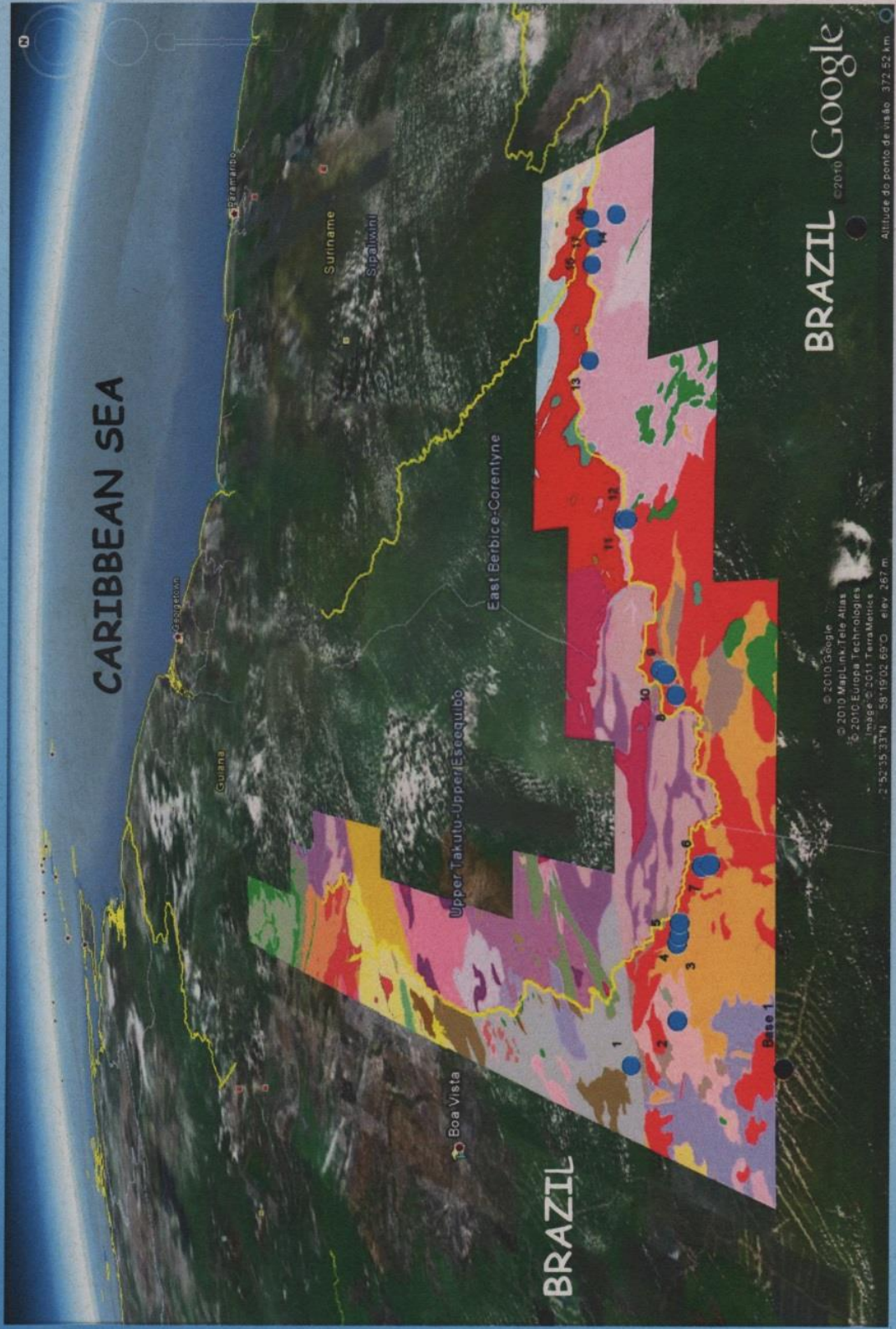
THE MAPPING AREA ON THE GOOGLE EARTH

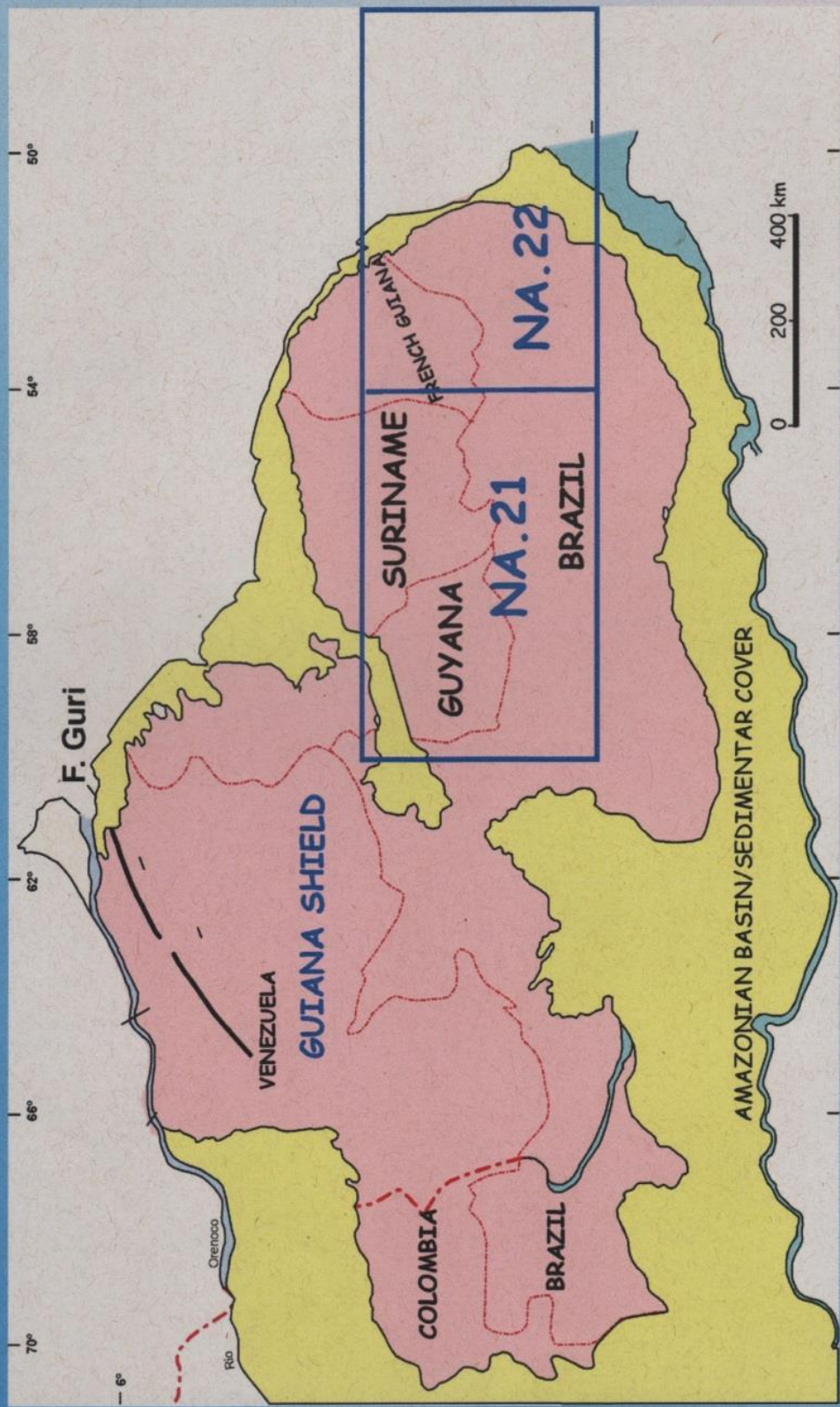
Polygon containing 25 km to each side along of the 1000 km - border line.



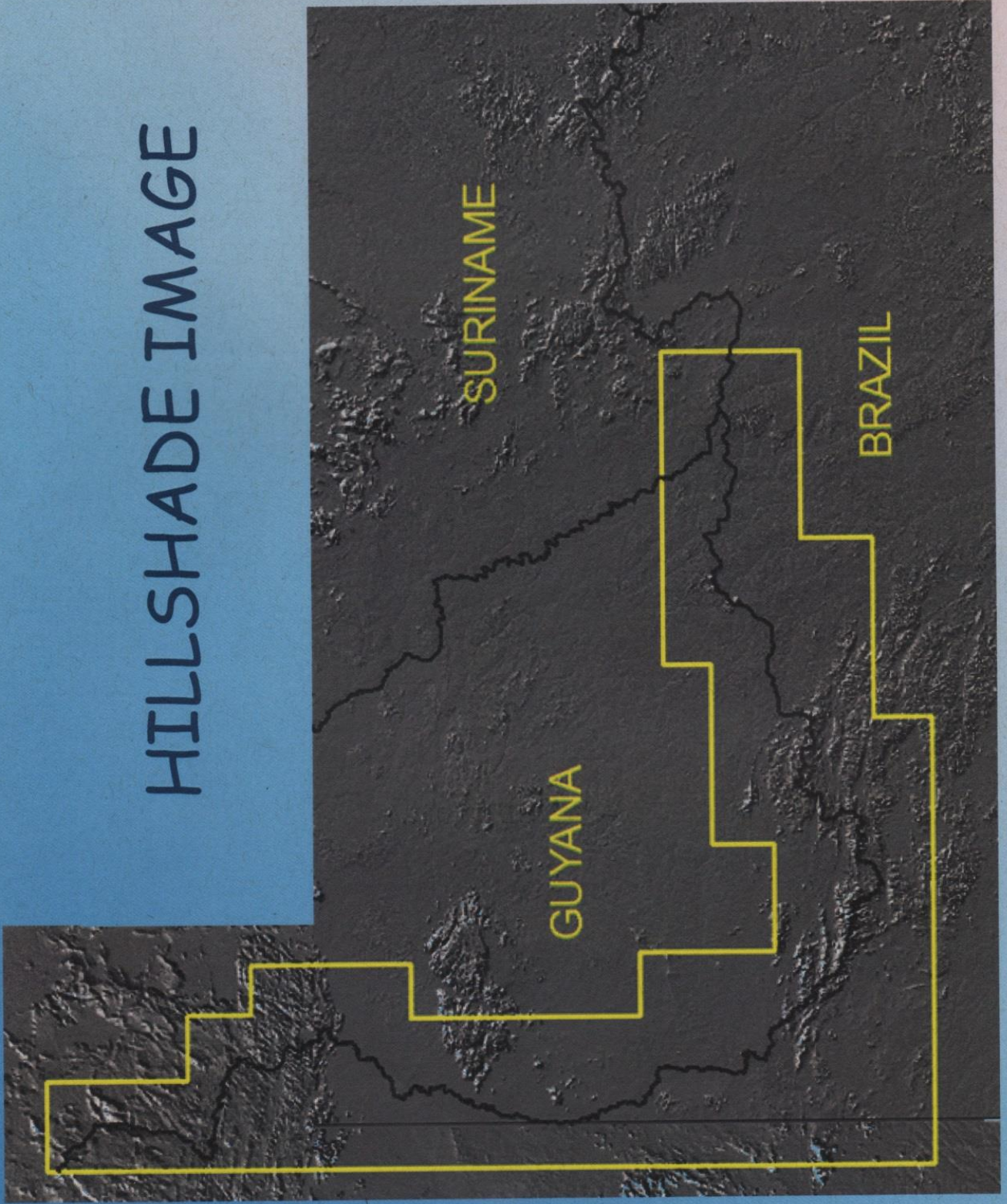
MAPPING AREA IN THE GOOGLE EARTH

The first draft of the geological map

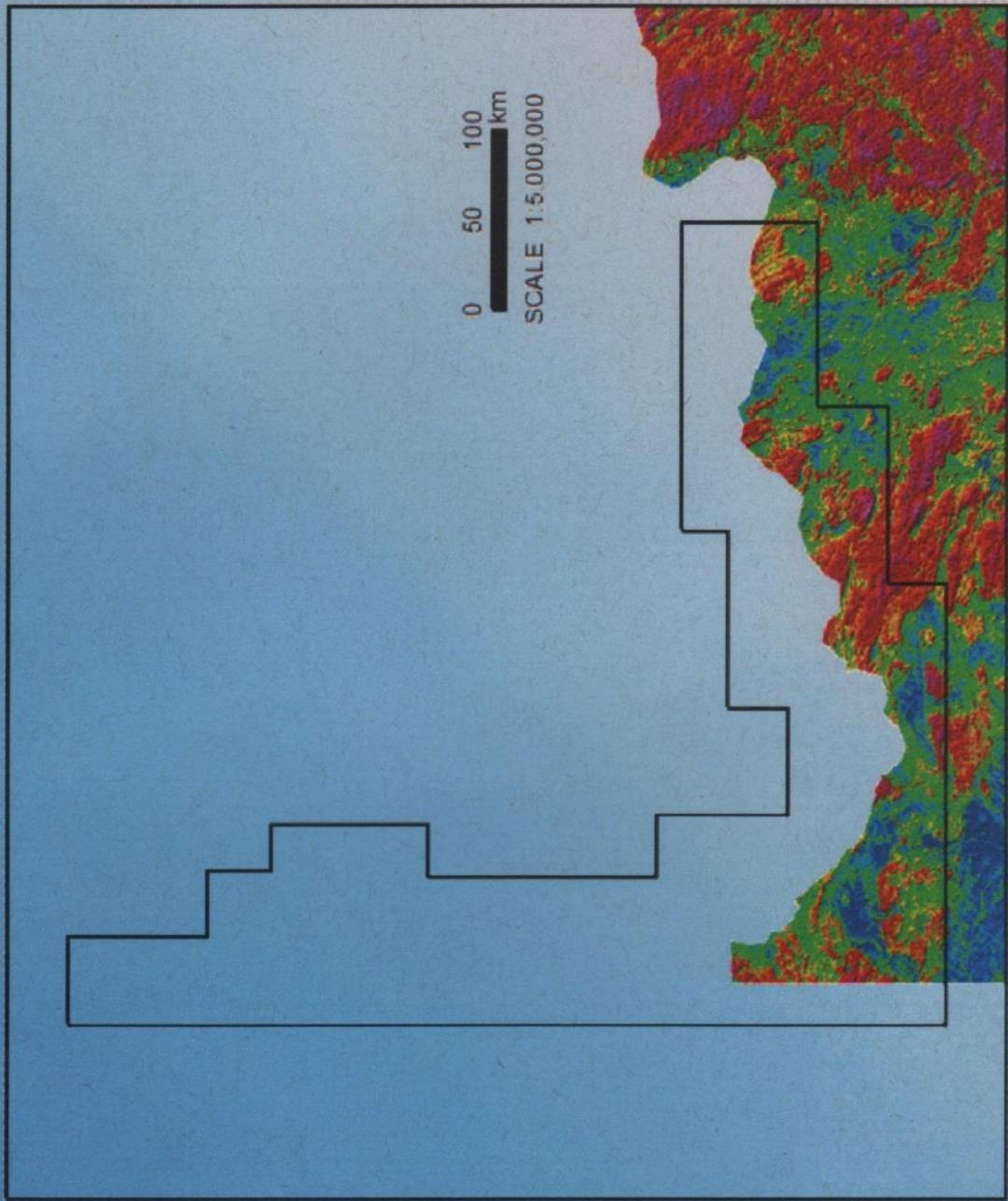




HILLSHADE IMAGE

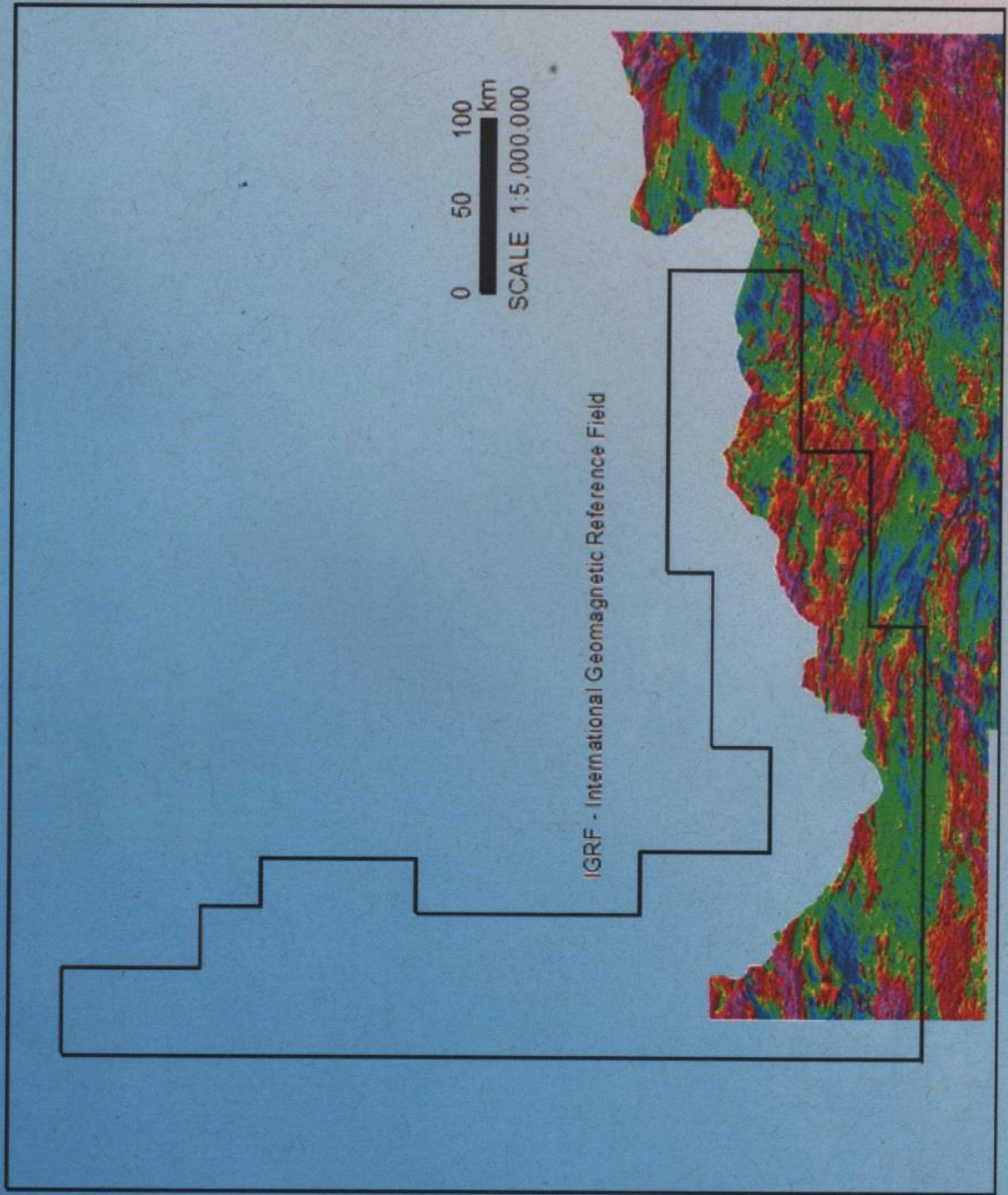


AEROGAMASPECTROMETRY Total Count



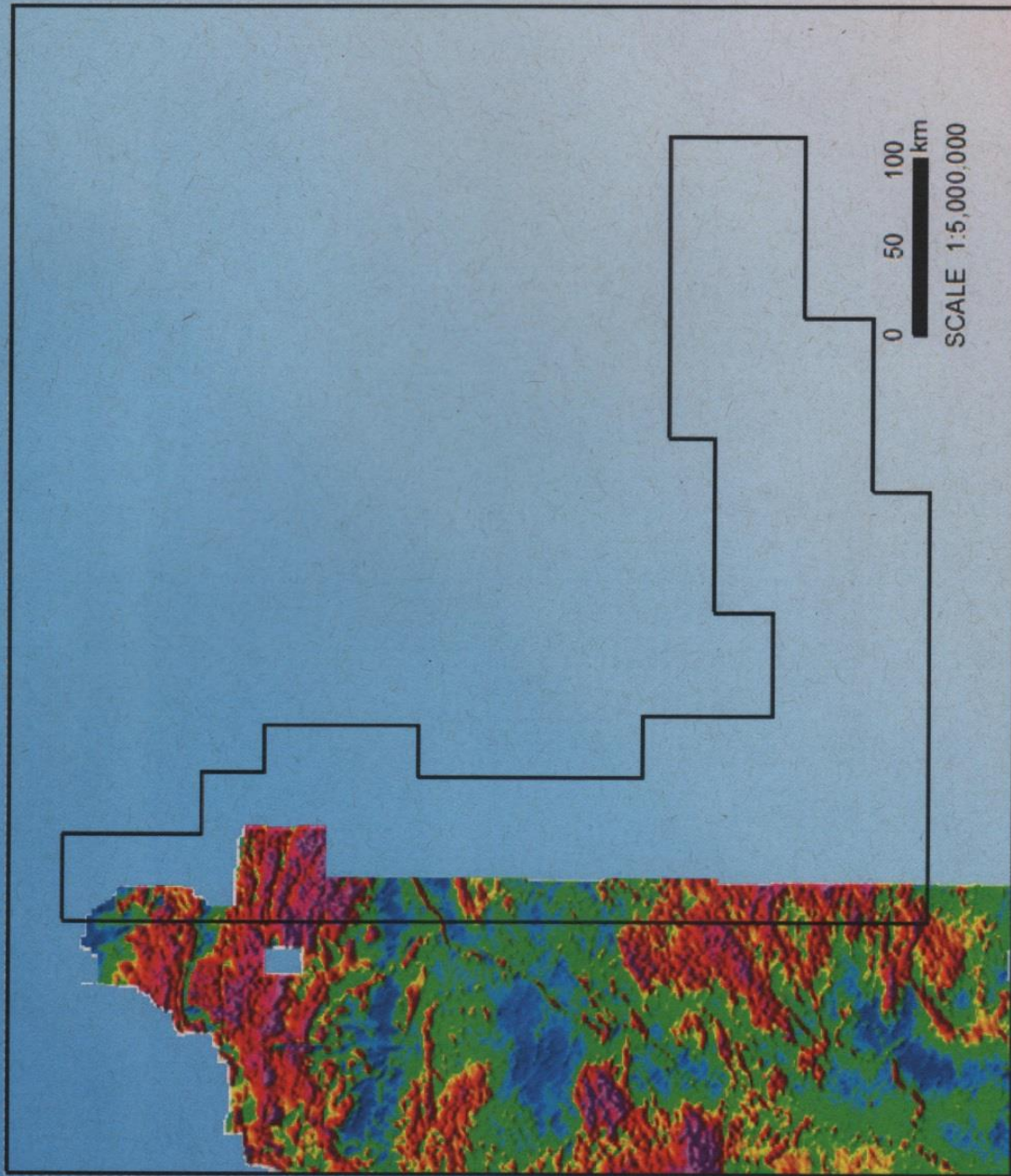
AEROMAGNETOMETRY

Reduced Total Field From IGRF



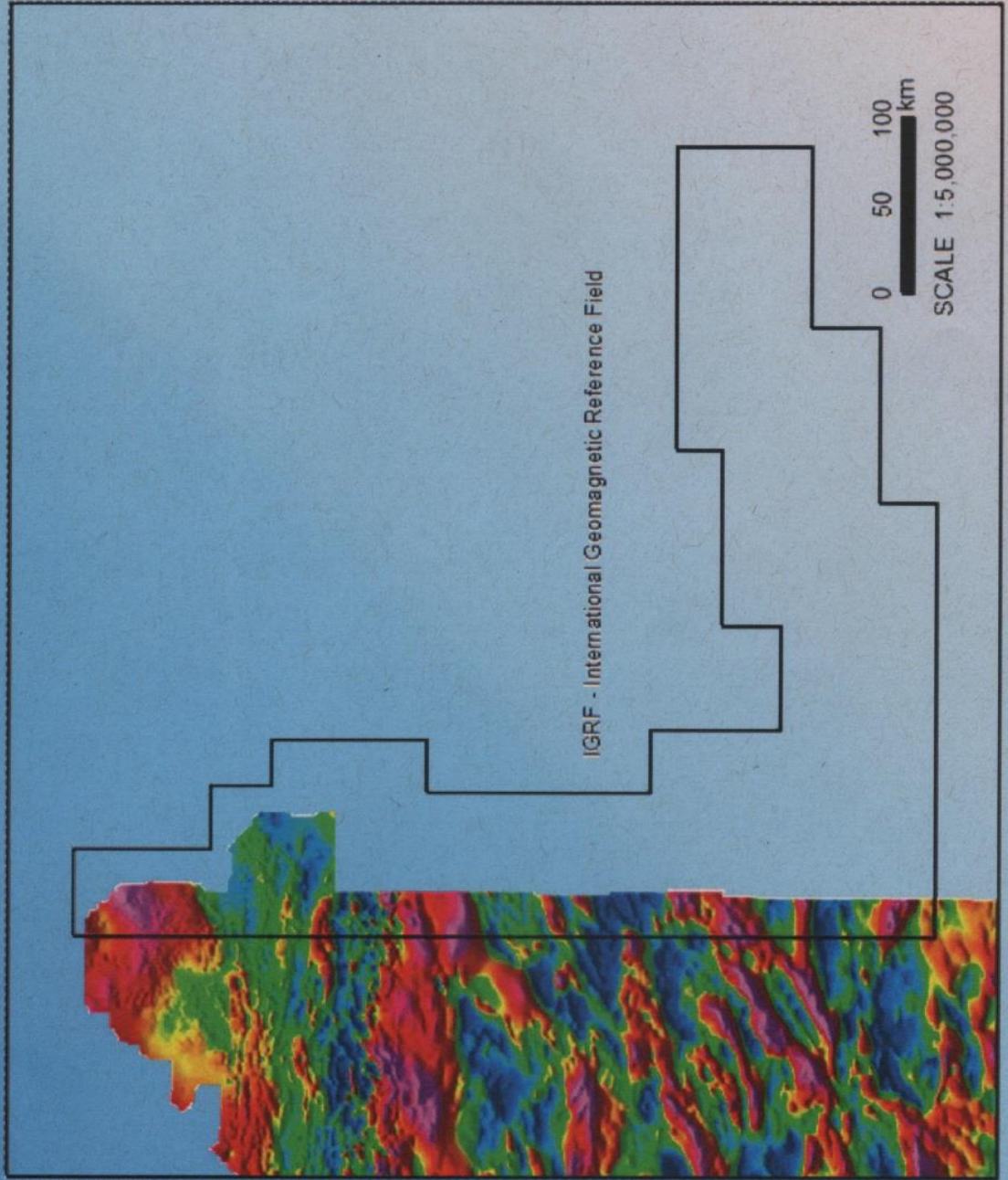
AEROGAMA SPECTROMETRY

Total Count



AEROMAGNETOMETRY

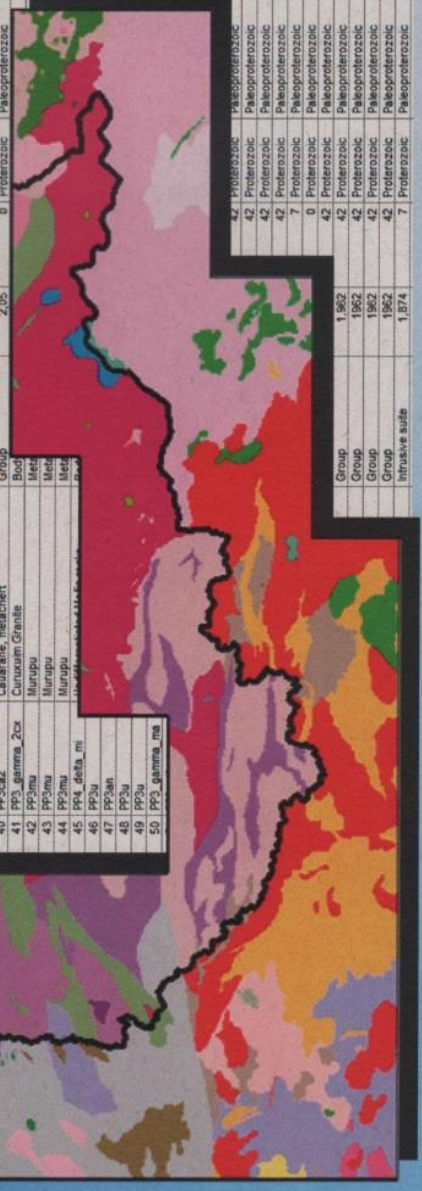
Reduced Total Field From IGRF



Geology shapefile and attribute table

of naz1_geology

ID	OBJECT	UNIT CODE	UNIT NAME	HIERARCHY	MAX AGE	MAX ERROR	MAX ERA	MAX PERIOD	MAX EPOCH	MAX M	MAX MET
1	PP24_gamma_sb	Saracura	Intrusive suite		2,05	0	Paleoproterozoic	Orosirian		Stratigraphic/Structural	Field relations
2	PP3_alfa_au	Sunumu	Group		1977	0	Proterozoic	Orosirian		U-Pb SHRIMP in Mineral	U-Pb SHRIMP in Mineral
3	PP3_alfa_bu	Sunumu	Group		1,977	0	Paleoproterozoic	Orosirian		Field relations	Field relations
4	Q28	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	U-Pb SHRIMP in Mineral	U-Pb SHRIMP in Mineral
5	PP3_alfa_bu	Sunumu	Group		1,977	0	Paleoproterozoic	Orosirian		Field relations	Field relations
6	QAB	Areas Brancas	Formation		1,75	0	Phanerozoic	Quaternary	Pleistocene	Stratigraphic/Structural	Stratigraphic/Structural
7	Q28_gamma_ab	Saracura	Intrusive suite		2,050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
8	Q28_gamma_ab	Saracura	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Stratigraphic/Structural	Stratigraphic/Structural
9	Q28_gamma_mb	Aluvial Deposits	Unit		2,050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
10	PP24_gamma_ab	Aluvial Deposits	Unit		2,050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
11	Q1b	Serra do Bicorno Granite	Formation		2,31	0	Phanerozoic	Quaternary	Pleistocene	Stratigraphic/Structural	Stratigraphic/Structural
12	N1b	Areas Brancas	Formation		2,31	0	Phanerozoic	Quaternary	Holocene	Stratigraphic/Structural	Stratigraphic/Structural
13	N1b	Areas Brancas	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
14	O2a	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
15	O2a	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
16	O2a	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
17	E0b	Lutites and Gossans	Unit		85	5	Phanerozoic	Cretaceous	Lower	Field relations	Field relations
18	K1_beta_ap	Apotari, sapls	Formation		97	5	Phanerozoic	Cretaceous	Lower	Field relations	Field relations
19	K2a1	Serra do Tucano	Formation		96	5	Phanerozoic	Cretaceous	Upper	Field relations	Field relations
20	Q2a	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
21	Q2a	Aluvial Deposits	Unit		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
22	PP2a2	Areas Brancas	Formation		1,75	0	Phanerozoic	Quaternary	Pleistocene	Stratigraphic/Structural	Stratigraphic/Structural
23	PP2a2	Areas Brancas	Unit		1,75	0	Phanerozoic	Quaternary	Pleistocene	Field relations	Field relations
24	Q2a	Cuarame, metachert	Group		2050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
25	PP2m1	Rio Urubu, orthogneisses	Unit		1941	10	Proterozoic	Orosirian		Field relations	Field relations
26	PP3_mu_delta_ur	Urucacá	Metamorphic suite		0,875	0	Phanerozoic	Quaternary	Holocene	Field relations	Field relations
27	PP3_mu_delta_ur	Urucacá	Metamorphic suite		1969	3	Proterozoic	Orosirian		Field relations	Field relations
28	PP3_mu_delta_ur	Urucacá	Metamorphic suite		1800	3	Proterozoic	Orosirian		Field relations	Field relations
29	PP4_mu_delta_ur	Urucacá	Metamorphic suite		1969	3	Proterozoic	Orosirian		Field relations	Field relations
30	PP4_mu_delta_ur	Urucacá	Metamorphic suite		1800	3	Proterozoic	Orosirian		Field relations	Field relations
31	PP2a2	Cuarame, metachert	Group		2050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
32	PP2m1	Rio Urubu, leucogneisses	Unit		1941	10	Proterozoic	Orosirian		Field relations	Field relations
33	PP4_mu_delta_ur	Urucacá	Metamorphic suite		1969	3	Proterozoic	Orosirian		Field relations	Field relations
34	PP4_mu_delta_ur	Urucacá	Metamorphic suite		1800	3	Proterozoic	Orosirian		Field relations	Field relations
35	PP3_gamma_2c	Cunoum Granite	Unit		2050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
36	PP4_mu_delta_ur	Urucacá	Metamorphic suite		1969	3	Proterozoic	Orosirian		Field relations	Field relations
37	PP3_gamma_2c	Cunoum Granite	Unit		2050	0	Paleoproterozoic	Orosirian		Field relations	Field relations
38	PP2m1	Rio Urubu, leucogneisses	Unit		1941	10	Proterozoic	Orosirian		Field relations	Field relations
39	PP2m1	Cuarame, metachert	Group		1944	10	Proterozoic	Orosirian		Field relations	Field relations
40	PP2a2	Cuarame, metachert	Group		2,05	0	Paleoproterozoic	Orosirian		Field relations	Field relations
41	PP3_gamma_2c	Cunoum Granite	Unit		2,05	0	Paleoproterozoic	Orosirian		Field relations	Field relations
42	PP2m1	Rio Urubu, leucogneisses	Unit		1944	10	Proterozoic	Orosirian		Field relations	Field relations
43	PP2m1	Cuarame, metachert	Group		1944	10	Proterozoic	Orosirian		Field relations	Field relations
44	PP2m1	Rio Urubu, leucogneisses	Unit		1944	10	Proterozoic	Orosirian		Field relations	Field relations
45	PP4_delta_m	Urucacá	Metamorphic suite		1,962	42	Proterozoic	Orosirian		Field relations	Field relations
46	PP2u	Aluvial Deposits	Unit		1962	42	Proterozoic	Orosirian		Field relations	Field relations
47	PP2m1	Rio Urubu, leucogneisses	Unit		1962	42	Proterozoic	Orosirian		Field relations	Field relations
48	PP2u	Aluvial Deposits	Unit		1962	42	Proterozoic	Orosirian		Field relations	Field relations
49	PP2u	Aluvial Deposits	Unit		1962	42	Proterozoic	Orosirian		Field relations	Field relations
50	PP3_gamma_ma	Aluvial Deposits	Unit		1,874	7	Proterozoic	Orosirian		Field relations	Field relations



Layout of the geological map - The First Draft

