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

**COOPERAÇÃO TÉCNICA CPRM – BRGM**

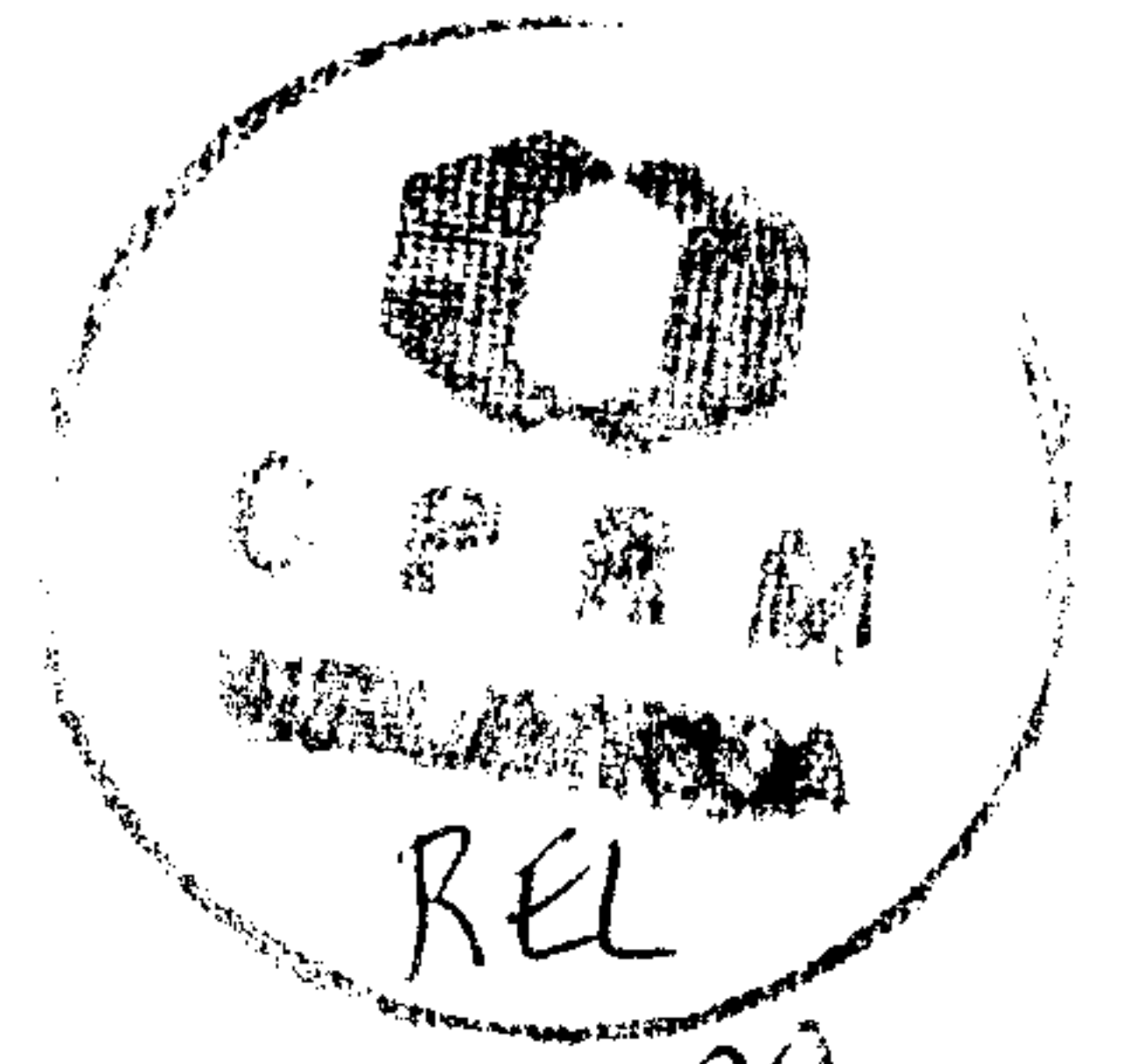
**RELATÓRIOS DE TRABALHO DE CAMPO**

*PROJETO FRENCH – BRAZILIAN 1:250.000  
TRANSBOUNDARY GEOLOGICAL MAP AROUND THE  
OYAPOCK RIVER*



- Geólogo Dr. Théveniaut Hérve / BRGM
- Geóloga Dr<sup>a</sup>. Maria Telma Faraco / CPRM

Outubro/2006



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# RELATÓRIO DE TRABALHO DE CAMPO

Dr. Théveniaut Hérve

Orléans, le 18 octobre 2006

CDG/CG  
HT/jb - 2006/070

## **Report on the September – October CPRM-BRGM field trip**

Author: Dr. H. Théveniaut

### **1 General frame**

Within the framework of the French-European CPER DocUp 2000-2006 program, BRGM carries out a project (GéOyapock) which aims to produce three new 1:100 000 geological maps of French Guiana (Armontabo, Saint-Georges de l'Oyapock and Camopi-Alicoto). This project also focuses on strengthening regional cooperation with scientific exchanges.

Recently, the French Geological Survey (BRGM) and the Brazilian Geological Survey (CPRM) have shown their will of cooperating by renewing a Memorandum of Understanding between both institutions.

This has been followed by an Agreement which will apply for the GeOyapock project with an objective of finalizing a first French-Brazilian geological map. This map (Saint-Georges – Oiapoque) will cover the 3 to 4° N latitude and extend from the Atlantic Ocean (51°W) to French Guiana at 52°30' W in longitude.

It will be presented at the 1:250 000 scale, with a French and Portuguese legend.

A few phases have been defined by both institutions to achieve this goal.

The first step has been the organization of a joint field trip on the Brazilian side along two "Rios" which flow towards the transboundary Oyapock River.

This field trip was organized with four people (Figure 1) representing both institutions. Dr. H. Théveniaut (Project leader) and B. Joseph represented BRGM, Dr. M.T.L. Faraco (geologist) and E.R.L. Leão represented the CPRM Pará-Amapá authority based in Belém.

This field trip is detailed through this report.



Figure 1: From left to right, H. Théveniaut, E.R.L. Leão, M.T.L. Faraco and B. Joseph

## 2 Field trip progress

25<sup>th</sup> of September : Dr. H. Théveniaut (BRGM) and B. Joseph (BRGM-Guyane) arrive at Saint Georges de l'Oyapock on the French Guiana side and meet Dr. M.T.L. Faraco and E.R.L. Leão (CPRM-Belém) at Oiapoque.

26<sup>th</sup> of September : All members of the field trip meet at "Degrad Maripa" on the French Guiana side a few km upstream of Oiapoque where the canoe is loaded and the field trip starts. The "Rio Anotaie" is reached around 3:00 pm where a night camp is settled up.

27<sup>th</sup> of September : We reached the southernmost "Cachoeira Lampion" where a night camp is settled and the geological investigations start.

28<sup>th</sup> of September till the 3<sup>rd</sup> of October : Detailed geological investigations (Figure 2) are carried out while going down the "Rio Anotaie" back to the Oyapock River

3<sup>rd</sup> to 4<sup>th</sup> of October : The team reaches the "Rio Cricou" up the "Cachoeira Fortaleza" where the geological investigations start.

4<sup>th</sup> to 7<sup>th</sup> of October : Detailed investigations (Figure 2) are carried out down stream up to the Oyapock river and back to "Degrad Maripa".

The field trip ends by a joint diner at Oiapoque and the BRGM people leaves Saint-Georges to Cayenne by car on the 8<sup>th</sup> while CPRM people leave Oiapoque to Belém by plane on the 9<sup>th</sup> of October.

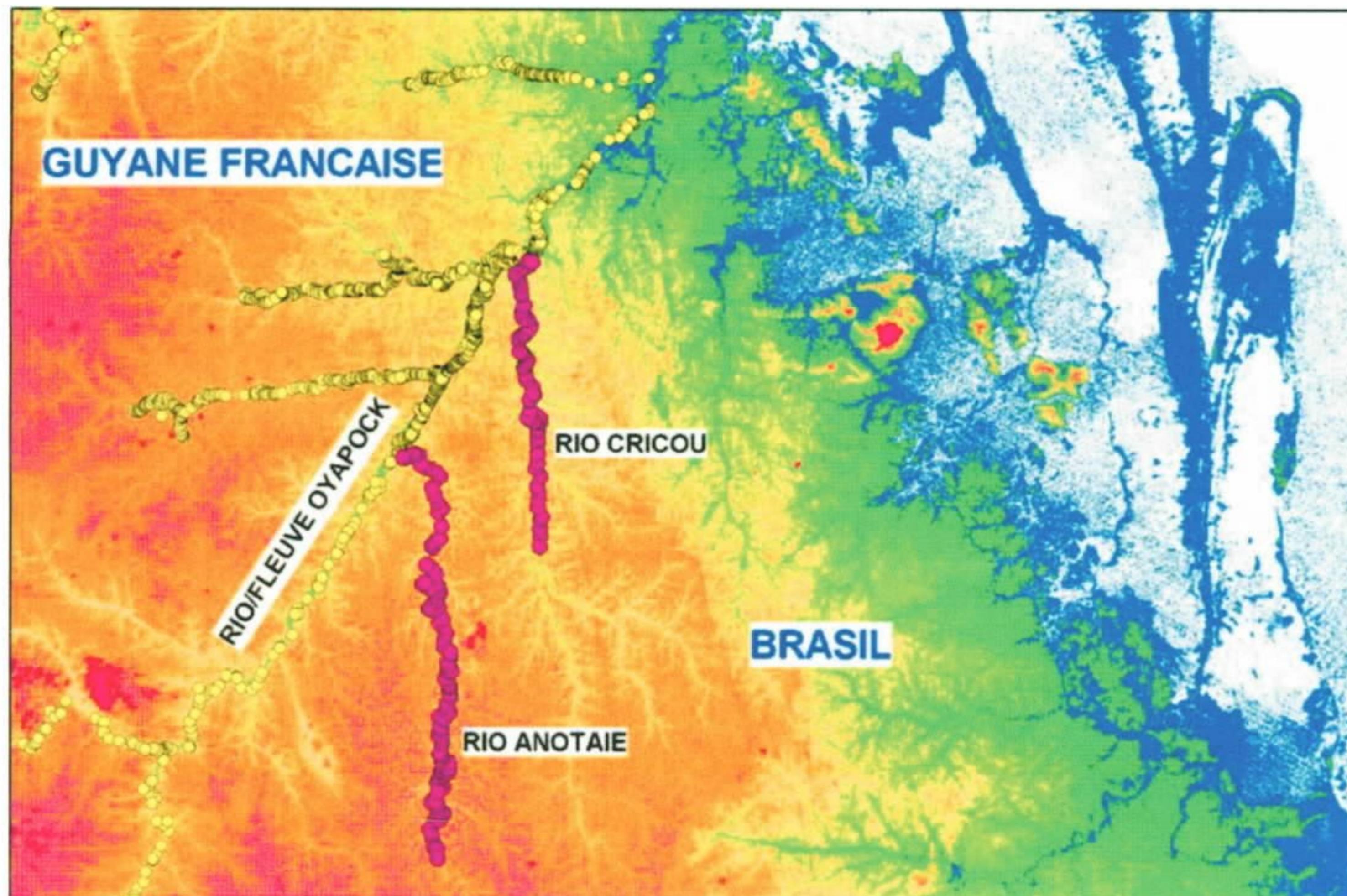


Figure 2: Referenced geological sites (pink) of this field trip on a topographic map of the area (from MNT SRTM) with BRGM-French Guiana former sites (yellow)

### 3 Preliminary results

171 geo-referenced geological sites were detailed during this two weeks field trip. 104 points were along the “Rio Anotaie” while the remaining 67 sites were along the “Rio Cricou”.

All points were geo-referenced by both B. Joseph and E.R.L. Leão using monofrequency GPS. Both also recorded continuously the track of both Rios which now allow a more precise and numerical drawing of these Rios.

The compositions of encountered formations are dominantly granitic and migmatitic (Figure 3) with few outcrops of meta-sedimentary or meta-volcanic rocks. There are possible slight differences between formation of this area and those already observed on the French Guiana side, both sides being complementary in such migmatitic to granitic context.

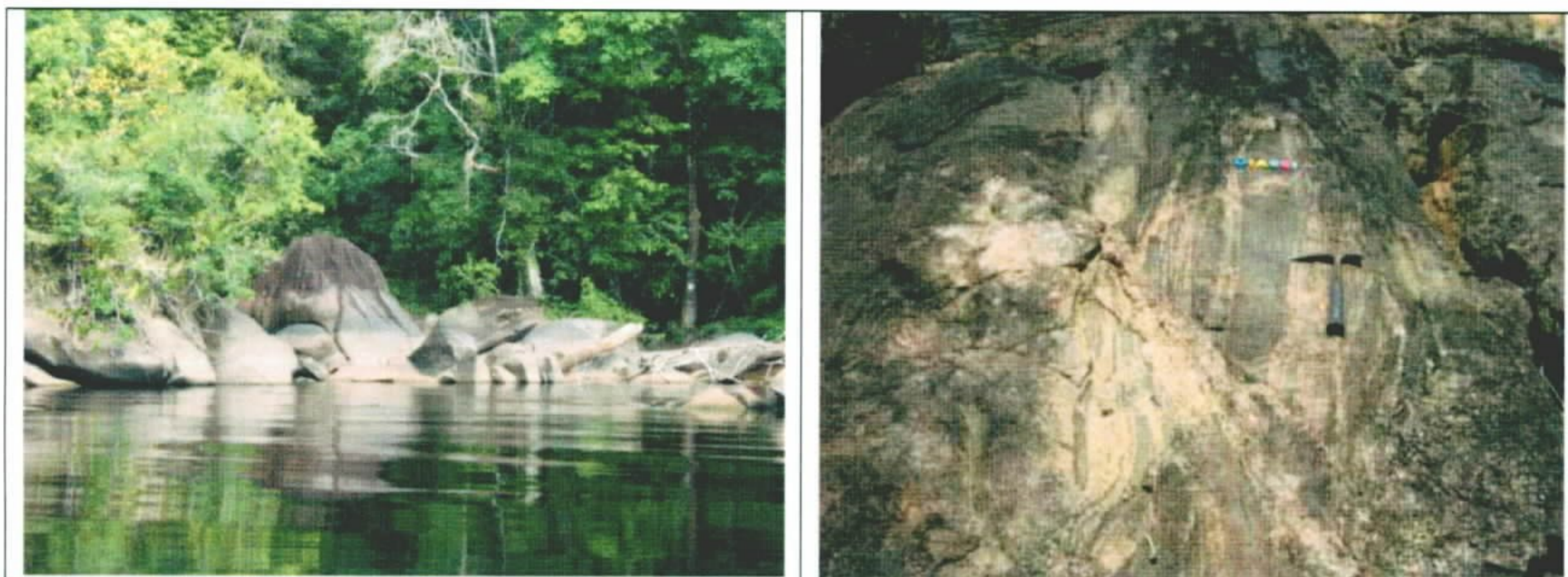


Figure 3: Coarse grained granite (left) and migmatite (right)

Other outcrops are represented by doleritic dikes (Figure 4, left) which may testify the strong Jurassic volcanic activity associated to the Central Atlantic Magmatic Province (CAMP) and the Breakup of Pangea and the following opening of the Atlantic Ocean.

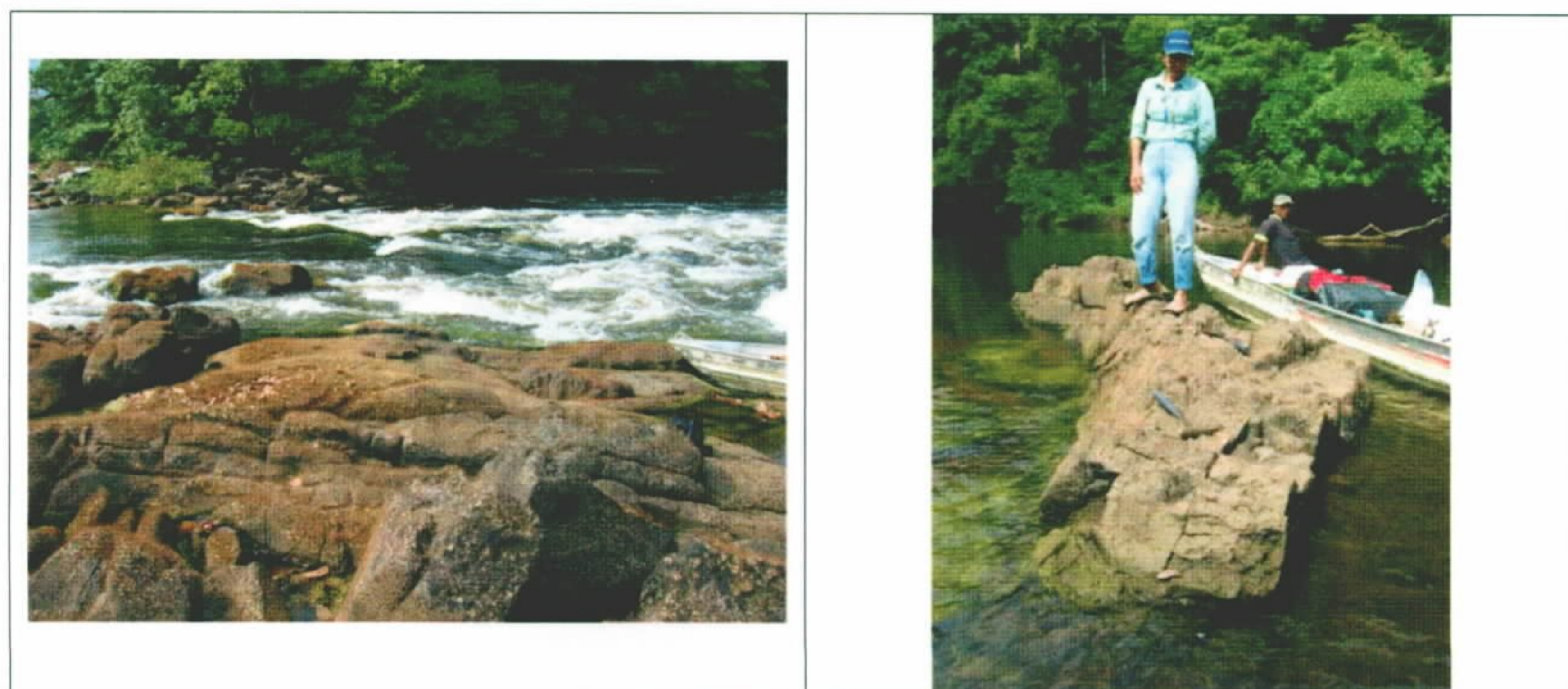


Figure 4: Dolerite dike at Cachoeira Bernard (left) and M.T.L. Faraco on the highly fractured witness of the Oyapock fault.

We also observed at one point on the “Rio Cricou” an occurrence of highly fractured rocks which seems continuous to the straight shape of the Oyapock river and associated highly fractured zone already found by BRGM along the Oyapock and recently dated to Jurassic time, just after the dolerite dike emplacement which are affected by this accident.

## 4 Following steps of the cooperation

Nearly all samples collected during this field trip have been sent to CPRM-Belém for detailed investigations like thin sections, geochemical analyses and geochronological dating.

A few samples were selected by BRGM for better characterization and dating (Ar/Ar) of the fractured zone and a few dolerites. One of these dolerites was collected along the Oyapock river to precise or confirm a recently obtained Neoproterozoic age (around 1Ga).

H. Théveniaut (BRGM) and M.T.L. Faraco will keep close contact on the analytical results and geological interpretations following this field trip.

Geophysical and geological exchanges are planned for 2007 to settle basis for achieving the common objective of a transboundary 1:250 000 geological map.

Orléans, the 17<sup>th</sup> of October 2006-10-17

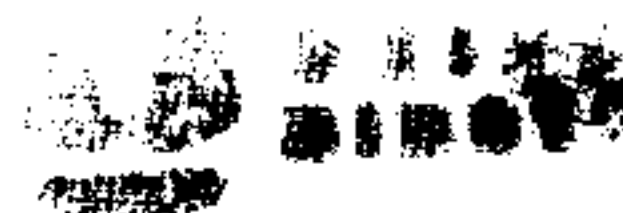
H. Théveniaut

### *Diffusion :*

BRGM : P. Ledru (DR/D), D. Vaslet (CDG/DIR), P. Rossi (CDG/CG), P. Weng (SAR/GGR/GUY)

CRPM : Maria Glicia da Nobrega Coutinho (Head of the International Affairs Office), Maria Telma Lins Faraco (Gerente de Geologia e Recursos Minerais, Bélem).

DRRT Guyane : P. Lecomte (DRRT)



# **RELATÓRIO DE TRABALHO DE CAMPO**

**Dr<sup>a</sup>. Maria Telma Faraco**



Belém, 23 October 2006

## **BRGM - CPRM FIELD TRIP REPORT**

By: Maria Telma Lins Faraco

### **1. Overview**

BRGM carries out the GéOyapock Project which aims to produce three new 1:100.000 geological maps of the French Guiana (Armontabo, Saint-Georges de l'Oyapock and Camopi - Alicoto) and a French-Brazilian 1:250.000 transboundary geological map with a French/Portuguese legend, corresponding to the NA.22-V-B Sheet (3° to 4° N latitud and 51°W to 52°30'W longitud - Figure 1).

The conception of the French-Brazilian 1:250.000 transboundary geological map, detailed in a Memorandum of Understanding between the French Geological Survey (BRGM) and the Brazilian Geological Survey (CPRM) represents the commitment of cooperation between the two institutions.

A plan of work with six phases has been defined by BRGM - CPRM to achieve the French - Brazilian geological map. The first phase corresponded to the organization and execution of a joint field trip on the Brazilian side, along the Anotaié and Cricou tributaries of the Oyapock river.

The field works were carried out by Dr. Hervé Théveniaut (Project leader) and Bernard Joseph, from BRGM, and Dr. Telma Faraco and Edilberto Leão, from CPRM.

### **2. Field trip development**

On September 25 the French group (Dr. H. Théveniaut and B. Joseph) arrive at Saint Georges de l'Oyapock city, on the French Guiana side, and meet the Brazilian group (Dr. Telma Faraco and E. Leão) at Oiapoque city (Figure 2), on the Brazil side.

On September 26 the two groups meet at "Degrad Maripa" on the French Guiana side a few km upstream from Oiapoque city, where the canoe is loaded and the field trip begins. After going 55 km up the Oyapock river, the team reaches the mouth of the Anotaié river. Camp is set up for the night about 3 km upstream from the river mouth.

On September 27 the group reaches the southernmost "Cachoeira Lampião" (Figure 3), where a night camp is set up and the geological investigation begins.

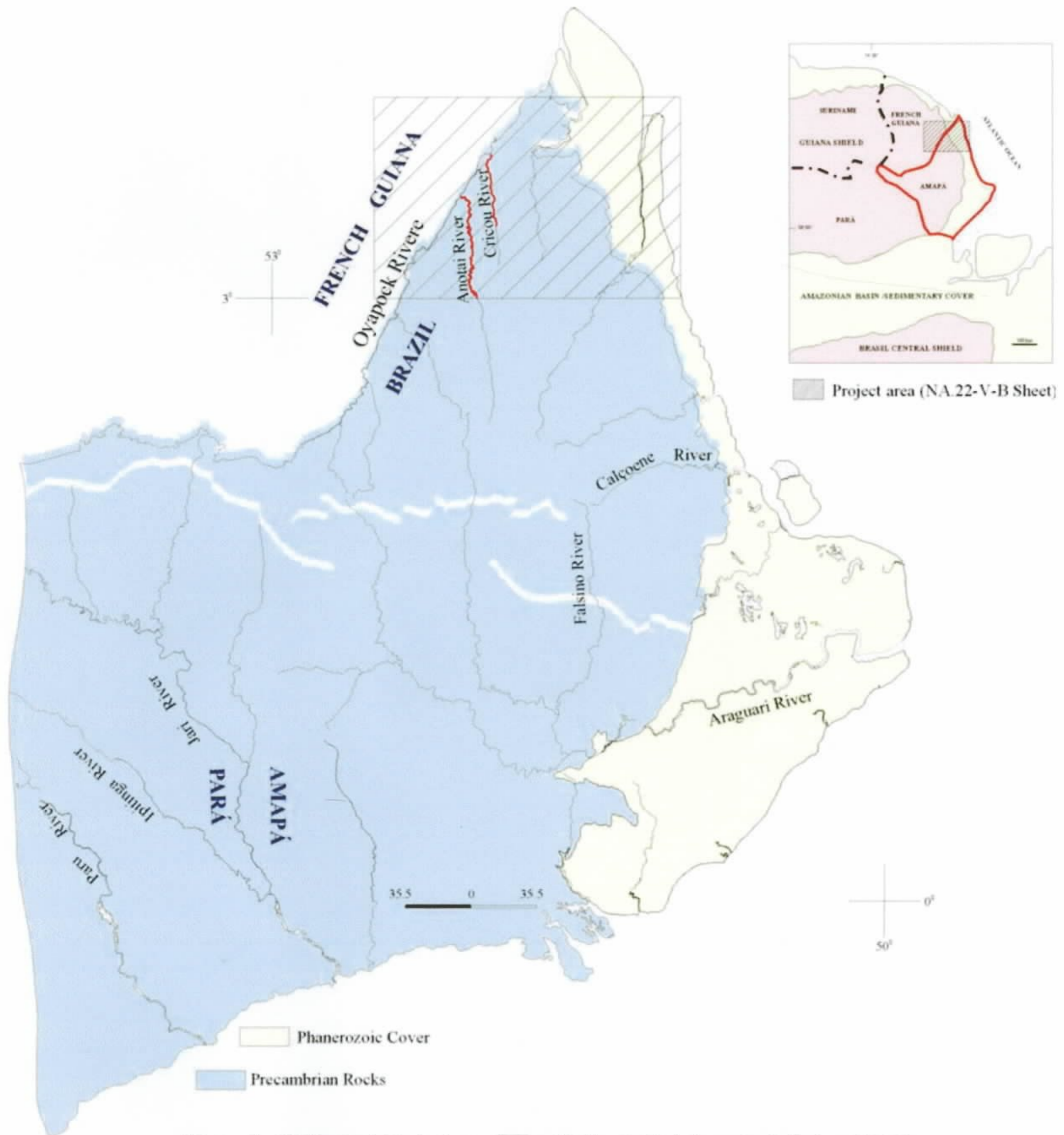


Figure 1 - GéOyapock Project area with the studied rivers (red) during this trip

From September 27 to October 3 - the team performs 77 km of detailed geological observations while going down the Anotai back to the Oyapock river.

From October 3 to October 4 - after traveling 80 km the team arrives at the "Cachoeira Fortaleza" along the Cricou river, where the geological investigations start.

From October 4 to October 7 - 47 km of detailed observations are carried out downstream of the Cricou river towards the Oyapock river and a further 23 km up to Oiapoque city.

The field trip finishes after a get-together dinner at Oiapoque city. On October 8 the BRGM group leaves Saint-Georges to Cayenne, and on October 9 the CPRM team departs by plane Oiapoque to Belém.

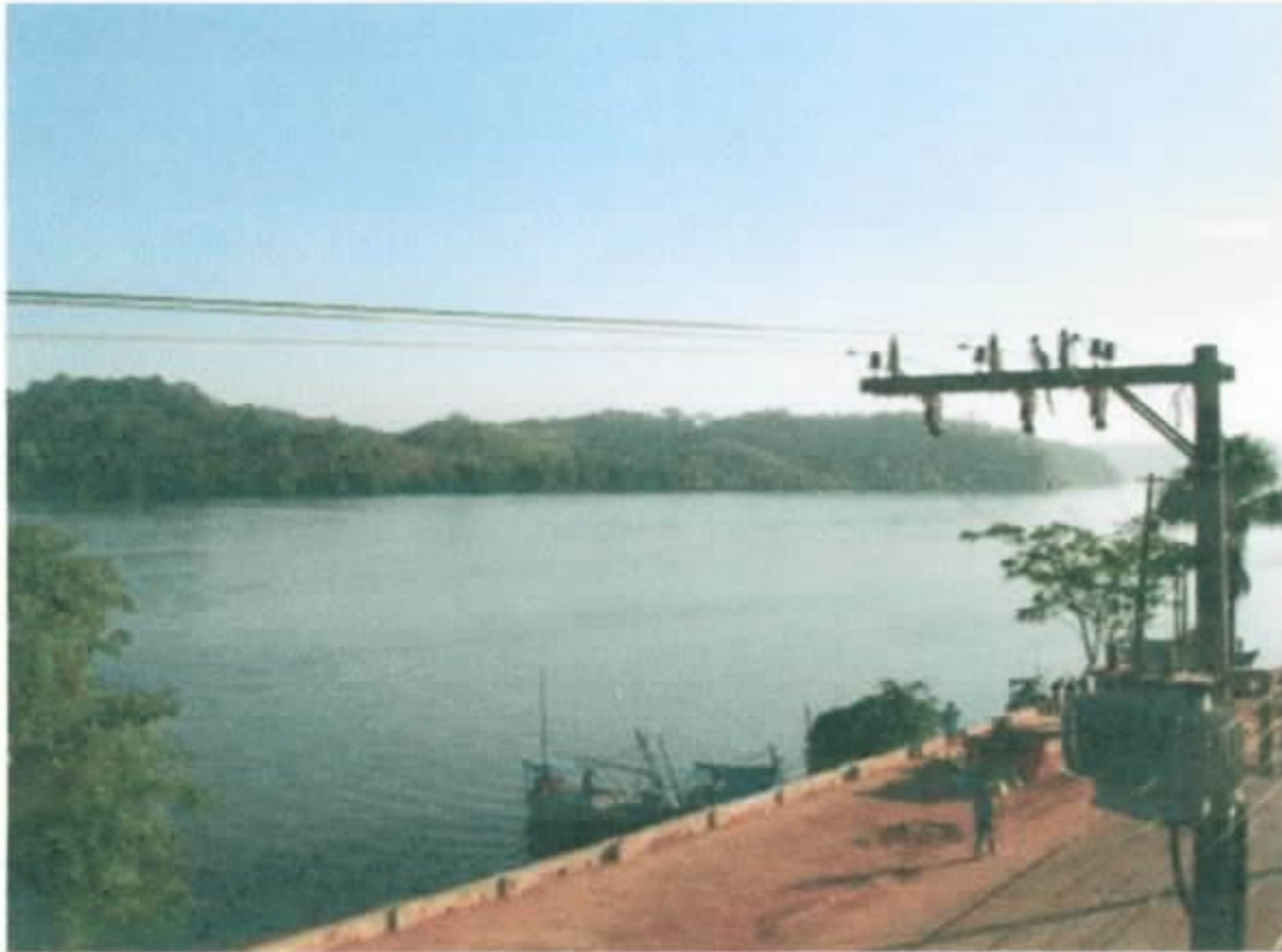


Figure 2 - Oyapock river seen from Oiapoque city (Brazilian side) on the border Brazil-French Guiana.



Figure 3 - "Cachoeira Lampião" at Anotaie river.

### 3. Preliminary results

- 124 km of detailed geological investigations were carried out (77 km along the Anotaie river and 47 km along the Cricou river). A total of 358 km moving around was necessary to cover these geological observations.
- Detailed studies of 171 geo-referenced geological sites were done ( 104 along the Anotaie and 67 along the Cricou river).
- 141 samples of rocks were taken for further studies.
- The studied region contains mainly granitoids (of several mineralogical compositions and textures) and migmatites (Figures 4 and 5). Some occurrences of meta-volcanic and meta-sedimentary rocks are observed. Diabase dikes are frequently found (varying from N 15° W to N 15° E). They represent the Jurassic mafic magmatism related to the opening of the Atlantic Ocean.



Figure 4 - Massive porphyritic granite, with  
felds  
par (up to 5 cm), quartz and mafics,

Figure 5 - Migmatite

#### **4. BRGM - CPRM cooperation follow up**

\*The 141 samples taken for studies were sent to CPRM - Belém.

\*Thin sections of these samples are being done.

\*41 of these samples are being prepared for chemical analyses and 12 for geochronological dating .

\*The 171 geological sites studied in this field trip have been geo-referenced on the WSG 84 datum and plotted on the Geocover image.

\*Close contact will be maintained between H. Théveniaut and T. Faraco for continuous discussions about the analytical results and geological interpretation.

\* Next year (first semester of 2007) the geophysical data from both sides will be integrated and interpreted by representatives of BRGM and CPRM, to form a common basis for the French - Brazilian 1:250.000 transboundary geological map.

Belém, October 23 2006

Telma Faraco

