

An Amazonian fluvial survey and its contributions to a strategic action plan on the water resource management on the world biggest watershed

Sondage fluvial en Amazonie et ses contributions pour un plan d'action stratégique sur la gestion des ressources en eau dans le plus grand bassin versant du monde

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RÉSUMÉ

Ce document rapporte les résultats d'un sondage mené par un groupe multidisciplinaire pour donner des informations à un plan d'action stratégique qui sera proposé par le projet GEF - Amazon à l'Organisation du Traité de Coopération Amazonienne (OTCA). Le travail a été effectué en 2013 dans deux systèmes fluviaux Amazoniens : Le Solimões / Amazon (février à avril) et Le Madeira / Amazon (octobre et novembre). La tranchée Amazonienne a été visitée deux fois. Les données ont été obtenues à partir d'échantillons d'eau de surface et à partir d'échantillons de sédiments prélevés au lit des fleuves dans chaque endroit. Le débit de l'eau a été mesuré en utilisant des dispositifs Doppler. Les résultats ont indiqué des scénarios (présentés ici) pour les deux systèmes, qui serviront à aider l'équipe GEF-Amazon à construire des actions futures pour la gestion de l'eau, concernant particulièrement les régions transfrontalières ainsi que certains sites particuliers dans le bassin de l'Amazonie centrale qui ont besoin d'un suivi.

ABSTRACT

This paper resume a survey conducted by a multidisciplinary group to give inputs to a Strategic Action Plan to be proposed by the GEF-Amazon project to the Amazon Cooperation Treaty Organization (ACTO). The work was done during 2013 at two Amazon fluvial systems: The Solimões/Amazon (Feb to Apr) and the Madeira/Amazon (Oct and Nov). The Amazon trench was visited twice. The data were obtained from surface water and from bed sediment samples collected. Water discharge was measured using Doppler devices. The results indicated scenarios for both systems to help GEF-Amazon team to build its future actions about water management especially concerning transboundary regions and also on some special sites in central Amazon basin needed to be monitored.

KEYWORDS

Amazon, Water, Resources, Management, Sediment.

1 INTRODUCTION

Water resources management policies have to consider many factors on it. Rivers can carry, not only water, but also sediments and other elements up to downstream. Sediments into the water conduct nutrients, but also contaminants on this rivers journey from the sources until their mouths.

On the scope of GEF-Amazon project, a survey of two field trips, one in the fluvial system Solimões/Amazon and another in the Madeira/Amazon were done in 2013. Those trips were done to help GEF-Amazon project decision makers to perform a SAP (Strategic Action Plan) concerning water resources management on the Amazon Basin, a task demanded by the Amazon Cooperation Treaty Organization (ACTO).

The field trips were performed to give an overview about the situation on sediment transport and also, about what kind of elements can be conducted with or by those sediments in two of the most important rivers at the Amazon Basin. The first survey was done between February and April on the Solimões/Amazon. The second one was done between October and November, on the Madeira/Amazon.

2 METHODOLOGY OVERVIEW

As the subject concerns big rivers and with no existence of too much roads in Amazon region, a kind of regional boat was used for the trips, but also cars were used on the Andean part. A total of 24 sites were visited in both fluvial systems (Figure 1); Rio Solimões at: Tabatinga (TAB); São Paulo de Olivença (SPO); Fonte Boa (FBO); Tefé (TEF); Itapéua (ITA) and Manacapuru (MAC); Rio Amazonas at: Jatuarana (JAT); Itacoatiara (ITC); Parintins (PAR) and Óbidos (OBI); Rio Tapajós at Santarém (SAN); Rio Beni at Rurrenabaque (RUR); Peña Amarilla (PAM); Riberalta (RIB) and Cachuela Esperanza (CES); Rio Madre de Dios at El Sena (SEN); Rio Mamoré at Guayaramerín (GUY); Rio Madeira at: Porto Velho (PTV); Humaitá (HUM); Manicoré (MAN) and Fazenda Vista Alegre (FVA).

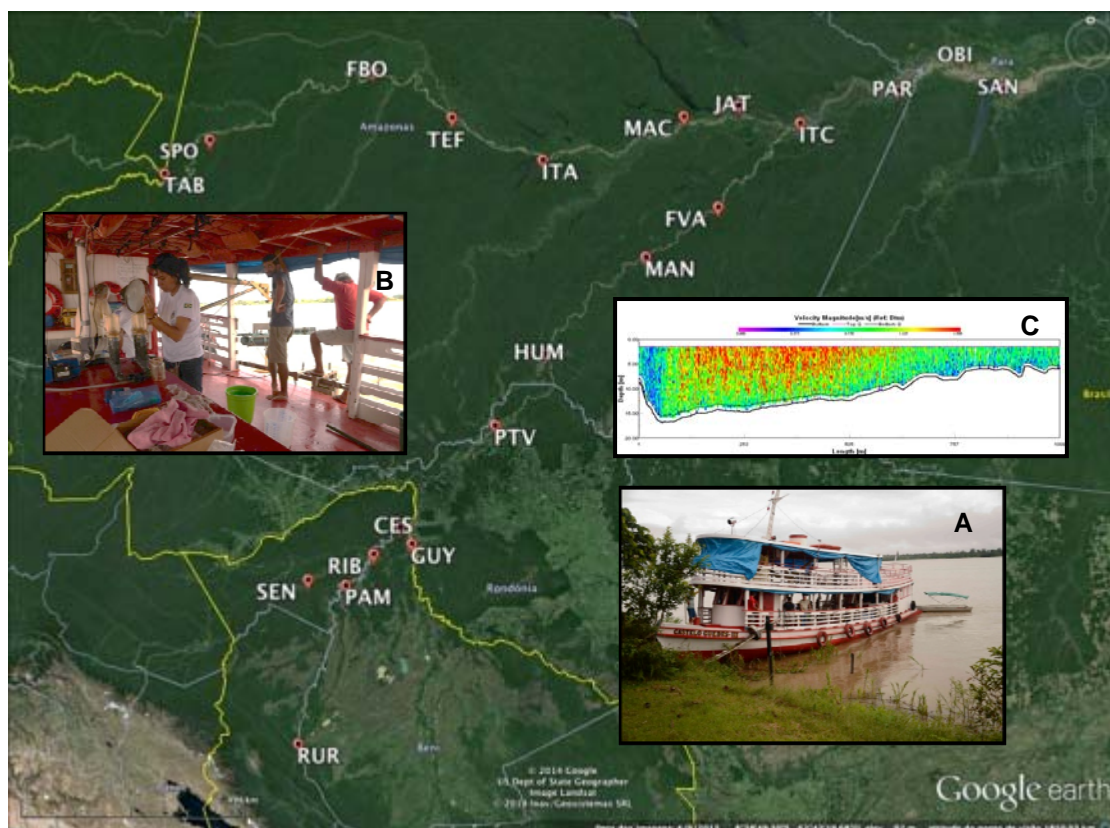


Figure 1. Sites investigated under the surveys done during 2013 at Solimões/Amazon and Madeira/Amazon Fluvial systems and the boat used (A) on the field trips with a laboratory infrastructure (B) and ADCP equipment to obtain rivers transects images (C). Using Google Earth maps background.

Water discharge measurements were performed using a 600 kHz acoustic Doppler current profiler device. The hydrology data was treated as it is described on the WMO (World Meteorological Organization) specific documents and Filizola and Guyot (2004). Water and suspended sediment

samples were obtained using a kind of 8 liters Van Dorn bottle, positioned according with the river flux (horizontally) as the one used by ORE-HYBAM (www.ore-hybam.org). For bed sediment a kind of 3kg Van Veen system bottle was used. Water samples were treated/prepared in the field and when necessary conserved on ice. The Suspended Sediment sample where obtained on the field, as well, where the water was filtered under a 0,45um mesh filter of cellulose acetate. Physical-chemical parameters, organic compounds (even Polycyclic Aromatic Hydrocarbons - PAH) and some metals where investigated both in suspended and in bed sediments. The methodology used for the water and sediment analysis on the laboratory was the one described by the Standard Methods for Water and Wastewater Examination from the American Public Health Association (APHA, 2005).

3 RESULTS AND FINAL COMENTS

The Solimões/Amazon scenario, for the investigated period, showed a figure still reported since the eighties. Important areas of sediment decrease were encountered between SPO and ITA and from MAC to JAT. A region with sediment increasing was marked between ITA/MAC and from JAT until OBI. For the Madeira/Amazon 4 QS domain was separated: QS1, an increasing scenario of sediment discharge; QS2 low sediment contribution, QS3 decreasing scenario and QS4 an increasing scenario, like the one identified on the first filed trip. Both situation can be seen on the Figures 2A and 2B.

About chemical parameters, the detected problems are punctual, not diffuse and also not persistent in the basin. Organic compounds, especially petrogenic contaminants (PAH) and also other specific parameters were rarely found near sites situated in important areas: 1) The transboundary regions (TAB and GUY), 2) The post Andes areas (RUR and SEN) and 3) Near some cities in Brazilian territory (PTV and ITC).

Based on the observations from the surveys done on 2013, four basic actions have to be considered by GEF – Amazon Project and ACTO when thinking about Amazon Basin water management: 1) Create a program of surveys done at least every five years to monitor water and sediment transportation by rivers and also considering contaminants fluxes as well; 2) Establish a program to identify the most important contaminant sources, focused in urban locations greater than 50,000 inhabitants (especially in transboundary region); 3) Associate, wherever possible, the water discharge measurements with sediment and water samples to calculate fluxes in different months of the year considering the hydrological periods. This will be useful to calculate solid and liquid flow and also a mass balance, to monitor trends in matter transport by rivers; and 4) Working with each government and local communities to implement educational programs about how to use rivers in a sustainable way.

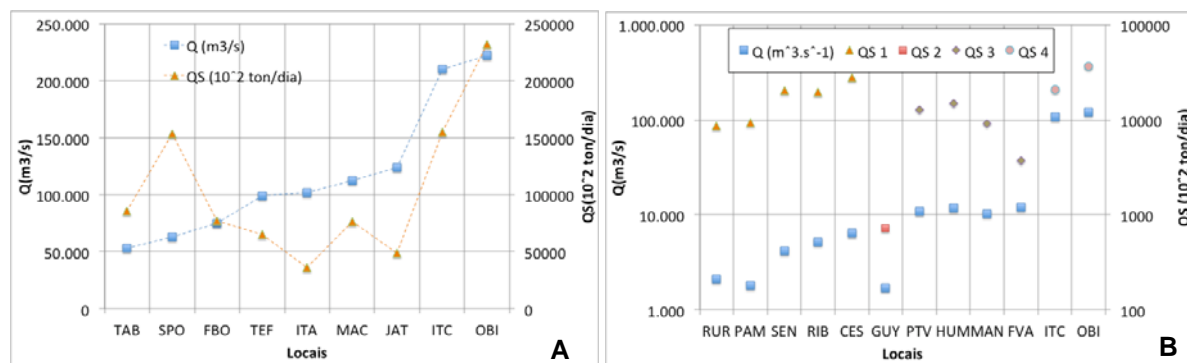


Figure 2. Water and sediment discharge scenarios for the two field trips done in 2013. Solimões/Amazon (A) and Madeira/Amazon (B). Water discharge (Q) done in cubic meters per second and Sediment discharge (QS) done in 10^2 tons per day.

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