

A VIRTUAL RECEIVING STATION FOR REMOTE SENSING USERS IN THE CARIBBEAN-AMAZONIAN AREA

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Commission VI, Working Group VI/3

KEY WORDS: NOAA-AVHRR, receiving station, image quality, international cooperation, ECOLAB, Amazonian coast.

ABSTRACT:

NOAA-AVHRR and SeaWiFS data are acquired daily by a receiving station located in Cayenne (French Guiana). Recently, a new development was undertaken to allow any user within the reception circle to access the satellite images using a PC and an internet connection. This tool is called a virtual receiving station. The variation of image quality within the reception circle has been studied, as well as the effect of data compression. This is promising tool for international cooperation.

1. INTRODUCTION

In 1998, an L-band HRPT receiving station was implemented in Cayenne, the capital of French Guiana, for daily reception of wide field satellite images. NOAA-AVHRR data have been received for 4 years, and SeaWiFS images have recently been available. The coverage area ranges from the Caribbean Sea to the Amazonian Basin, as shown on figure 1.

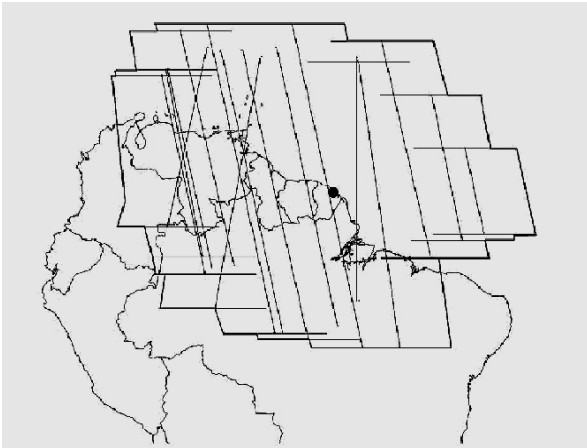


Figure 1: typical scene location map over 1 day

Different products are generated from the received data, e.g. classical color composites or more specific products such as water sedimentation index, vegetation index or sea surface temperature.

The main scientific application of these products consists in evaluating the impact of Amazon sediments on coastal processes. Other topics have been considered, such as :

- Deforestation monitoring
- Climatology
- Fisheries (understanding resource variations)
- Characterization of seaturtle habitat
- Malaria epidemiology

Scientists from French Guiana and Northern Brazil met several times in the frame of the ECOLAB research network, in order to evaluate the potential of wide field satellite imagery in an international cooperation context, and the data began to be shared.

After three years, it became obvious that the use of these data would be limited to French Guiana as long as an efficient distribution process would not be established between the receiving station and potential users of the area.

2. TOWARD A VIRTUAL RECEIVING STATION

Recently, a new development was undertaken to allow any user within the reception circle to access the images using a PC and an internet connection only, simulating to some extent a “virtual receiving station” (see figure 2).

This provides end users with the same service as if they were under their own antenna, except for two aspects :

- ◆ image acquisition is slightly delayed (from a few hours to a few days) ;
- ◆ image quality is likely to be degraded as explained in the next section.

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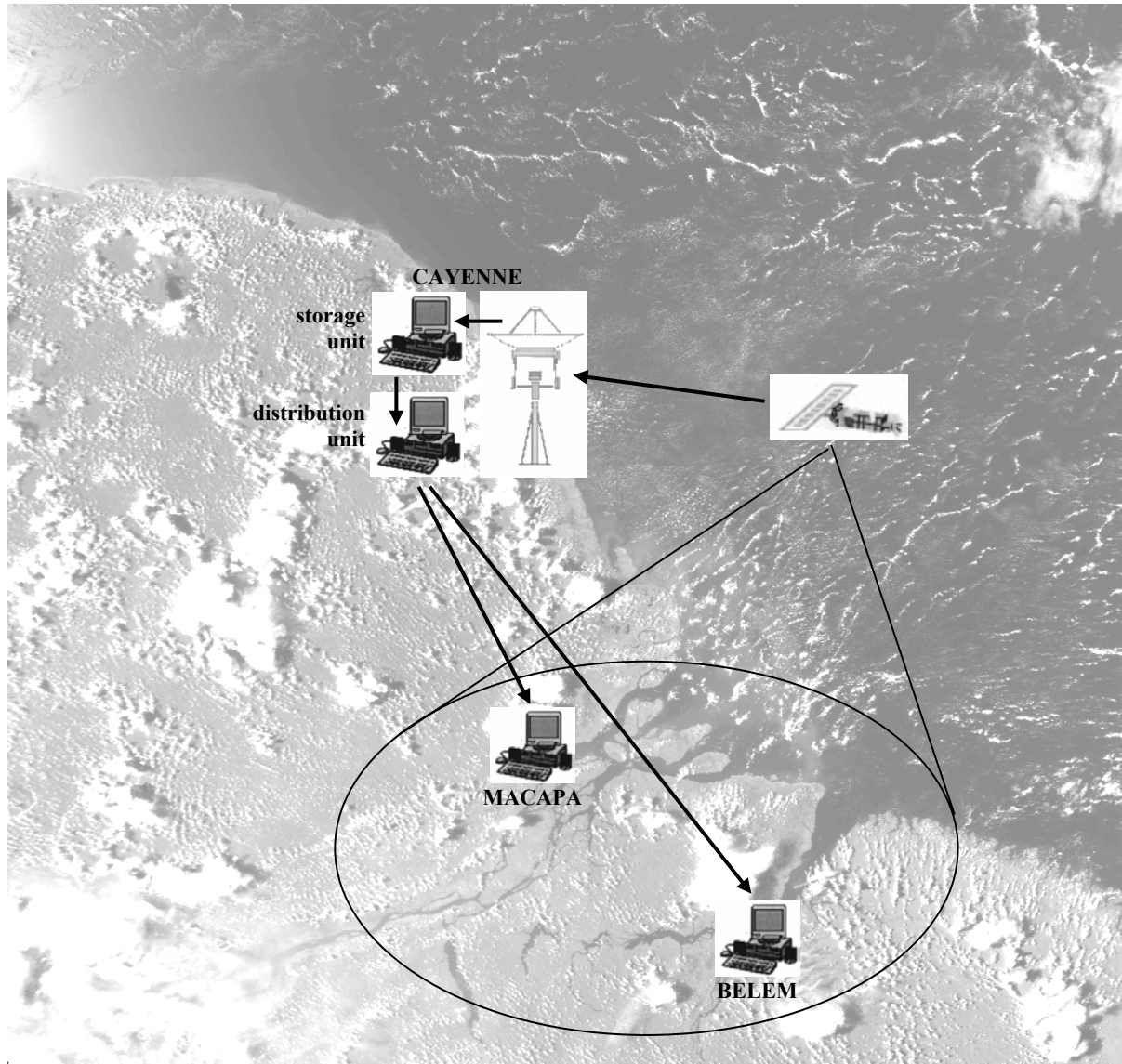


Figure 2: Scheme of data access between Cayenne and two pilot virtual stations

In order to make image selection more efficient and friendly, quick looks are generated for all images and they are accessible on the web. They are useful to check location and cloudiness. Quick look examples are shown on figure 3.

3. IMAGE QUALITY CONSIDERATIONS

Different users are likely to receive images with a variable quality, for two main reasons.

The first reason is the variation of image quality within the coverage circle. Indeed, the number of available images and the length of each image decrease as the elevation angle decreases. Moreover, as soon as the satellite is close to the horizon line, image quality is degraded very quickly. This is because any

terrain point located beyond this limit can only be seen in a side-looking geometry, so that atmospheric scattering increases and the mean pixel size becomes very large. It implies that these data will not be very interesting for partners working on such areas as Colombia (western limit) or the Brazilian Maranhão state (Eastern limit).

The second reason is the need for data compression in order to optimize the transfer. This requirement depends on the size of the data set to be transferred, on the number of Mb/s in the link, and on the specified acceptable time delay. Several formats were compared, and it was found that the image size could be divided by 5 or more using a classical JPG compression algorithm with a suitable rate.

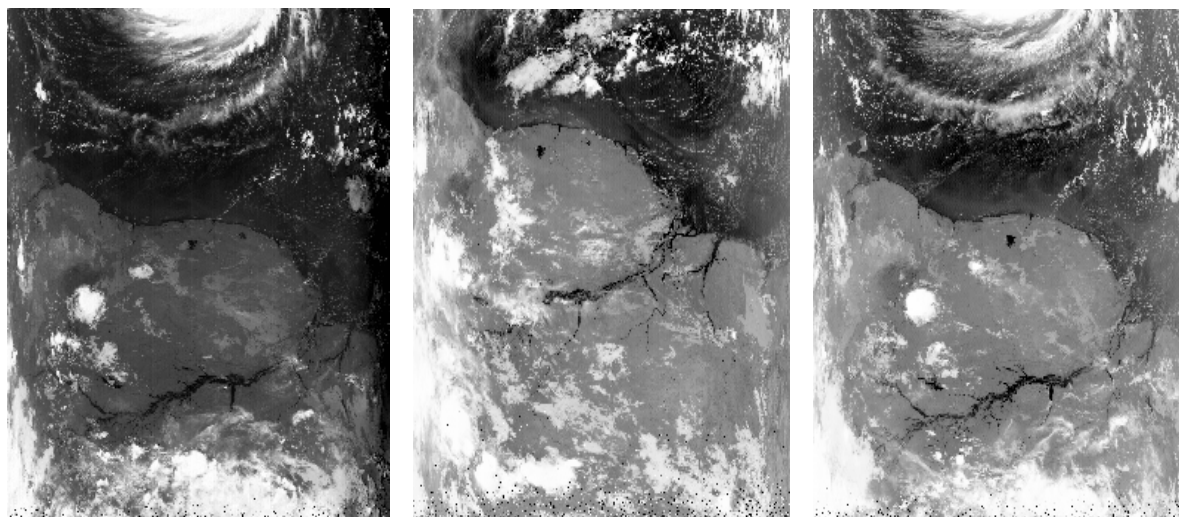


Figure 3: Quick look examples

4. A VALUABLE TOOL FOR INTERNATIONAL COOPERATION

The primary aim of this tool was to provide data for coastal research in the frame of the ECOLAB network, i.e. a research network spreading over Northern Brazil and the Guianas' Shield and dealing with the influence of the Amazon River on coastal geomorphology and ecology. However, the position and shape of the reception area suggest that coastal research is not the only potential application of the station, and that oceanographic and continental issues can be considered as relevant applications as well. A variety of products such as water sedimentation index, vegetation index or sea surface temperature will be accessed on line by any user within the Caribbean-Amazonian area.

In other words, this receiving station has been considered as a tool for international cooperation since the very beginning, and the new developments are still undertaken in an international context.

Scientific staff from IRD (Cayenne), IEPA (Macapa) and Museu Goeldi (Belem) had several meetings in the last years to examine the potential of NOAA-AVHRR data for their research. More recently, the virtual receiving station project gave the opportunity to consider a more effective partnership around the use of satellite imagery. Beyond research programmes, it is expected that the distribution on satellite images and derived products free of charge will be useful for high level education as well as for the popularization of environmental issues.

5. ACKNOWLEDGEMENT

The developments presented in this paper are funded by FEDER (Fonds Européen de Développement Régional), by the Regional Council of French Guiana (Région Guyane) and by IRD. We are indebted to several colleagues involved in these developments, in Cayenne (Boris Ruelle, Alex Melius and David Du) in Macapa (Andrei Oliveira, Rogerio Chagas) and in Belem (Amilcar Mendes).