REDD+ for the Guiana Shield

Technical and Regional Platform for the
Development of REDD+ in the Guiana Shield

Project Owner: Office National des Forêts (ONF)

Partners: ONFI / GFC and OCC (Guyana) /
IEF-AP and SEMA-AP (Brazil) / SBB and NIMOS (Suriname)

Donors: Program INTERREG Caraïbes of the European Union / Fonds Français pour l'Environnement Mondial (FFEM) / Conseil Régional de la Guyane (Région Guyane) / ONF

Training and Technology Transfer

Tablets for fieldwork & Advanced training course on the use of SAR SENTINEL-1 data

CONTEXT

The project **«REDD+ for the Guiana Shield - Technical Regional Platform for REDD+ Development in the Guiana Shield»** aims at providing information and tools at the regional level to be used by countries to establish sound monitoring and science-based policies, in the framework of the REDD+ mechanism, to tackle deforestation and forest degradation. The project is financed with an amount of 2.7 million euros by the Fonds Européen de Développement Régional (FEDER), the Fonds français pour l'Environnement Mondial (FFEM) and the Conseil Régional de la Guyane. It involves forestry departments from the State of Amapá in Brazil, Suriname, Guyana and French Guiana, which in sum cover a large share of the Guiana Shield eco-region.

Through a series of activities (working groups, training sessions, creation of regional tools), the project has the following objectives:

- Strengthen the capacity, knowledge and expertise on REDD+ in the forest services of different partner countries. The targeted topics are the evaluation and monitoring of forest cover and carbon stocks, evaluation and monitoring of drivers of deforestation and modeling of future deforestation;
- Encourage and facilitate the dialogue in the region on the technical issues cited above, in order to create a common understanding of the challenges of reducing deforestation in the ecosystem of the Guiana Shield;
- Develop tools to support the implementation of REDD+ and land use in the region.

TRAINING AND TECHNOLOGY TRANSFER (TTT) BUDGET AND NEEDS

As presented during the last Steering Committee meeting (SCM5), around 65 000 € of TTT budget still needs to be allocated before the end of the project. Most of this budget, around 60 000 €, is dedicated to technology transfer that can be used to buy data and equipment. To be eligible, the product provided must be regional (i.e. identical for all partners) and in line or in the continuity with capacity building activities performed in the project.

The results of a requirement analysis among project partners show common needs for:

1. The same model of tablets for field work that was used during the Radar workshop
2. RADAR data, such as ALOS PALSAR data that was processed during the last Radar workshop

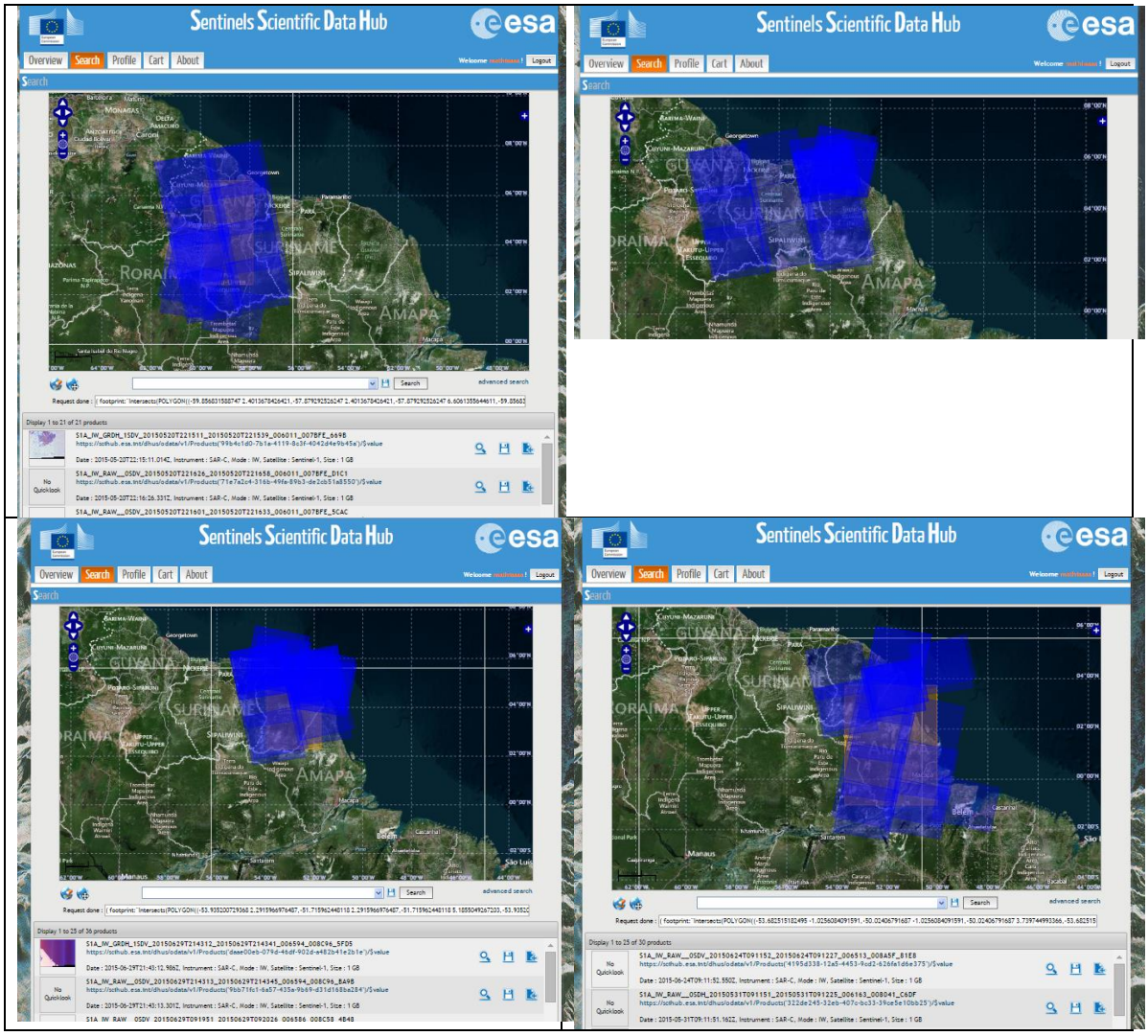
TRAINING AND TECHNOLOGY TRANSFER (TTT) PROPOSITIONS

Based on these common needs, we can make the following propositions:

1. Acquisition of 5 SAMSUNG GALAXY TAB ACTIVE 8" SM-T360 16 GO BLACK + 5 extra battery for each partner

The following link details the specifications of the product: http://www.samsung.com/us/business/mobility/tablets/SM-T360NNGAXAR

2. The remaining budget available for buying commercial ALOS-2 RADAR data does not allow to cover the whole project area. However, while negotiating the price for ALOS-2 data with the image provider, we realized that the project area was recently fully covered by the freely available ESA Sentinel-1 RADAR data (see figure below).



Launched in 2014, ESA Sentinel-1 RADAR data was not yet available in the region. Data started to be acquired in the region end of April 2015, i.e. just after the workshop on the use of Radar imagery for forest monitoring. Long awaited, these data are now available for download on the ESA Sentinel Scientific Data Hub website (https://scihub.esa.int/), offering great opportunities for forest monitoring at no cost, especially in areas with persistent cloud cover as the Guyana Shield where the use of optical data can be difficult.

However, the characteristics of Sentinel-1 data (Band C; polarization VV VH) differ from PALSAR data (Band L; polarization HH HV) that was processed and analyzed during the Radar training sessions, and this high amount of newly available data need to be preprocessed before it can be used in production. The preprocessing steps can take a lot of time and hinder the short-term use of the data. Moreover, ESA just released a new open source software called SNAP to process these data that aims to be used for all Sentinel products including Sentinel-2. This software contains the tools used in NEST and SENTINEL toolbox software's during both RADAR training sessions.

Therefore, based on this recent availability of Sentinel-1 data and the opportunity for the partners to complement the use of optical data with this data to monitor their forests at low cost in the future, we propose to focus the budget dedicated to RADAR imagery on the operational use of Sentinel-1 data, instead of buying commercial images that will not fully cover the territory.

In the continuity of the previous RADAR sessions, please find below our full package proposition to ensure the short-term availability and use of pre-processed Sentinel-1 data for the complete project area:

A. Delivery of all GRD Sentinel-1 data available so far to each partner for his own territory
B. Delivery of one-date full Mosaic of preprocessed Sentinel-1 data
C. Delivery of tools to optimize the preprocessing production
D. Delivery of video tutorials to process GRD Sentinel-1 data and use optimized tools
E. Demonstration of Sentinel-1 temporal analysis capabilities on dedicated study site
F. Capacity building Workshop

This package would be managed by the experts' team that delivered both RADAR sessions. Please find below a detailed description of all points:

A. Delivery of all GRD Sentinel-1 data available so far to each partner for his own territory

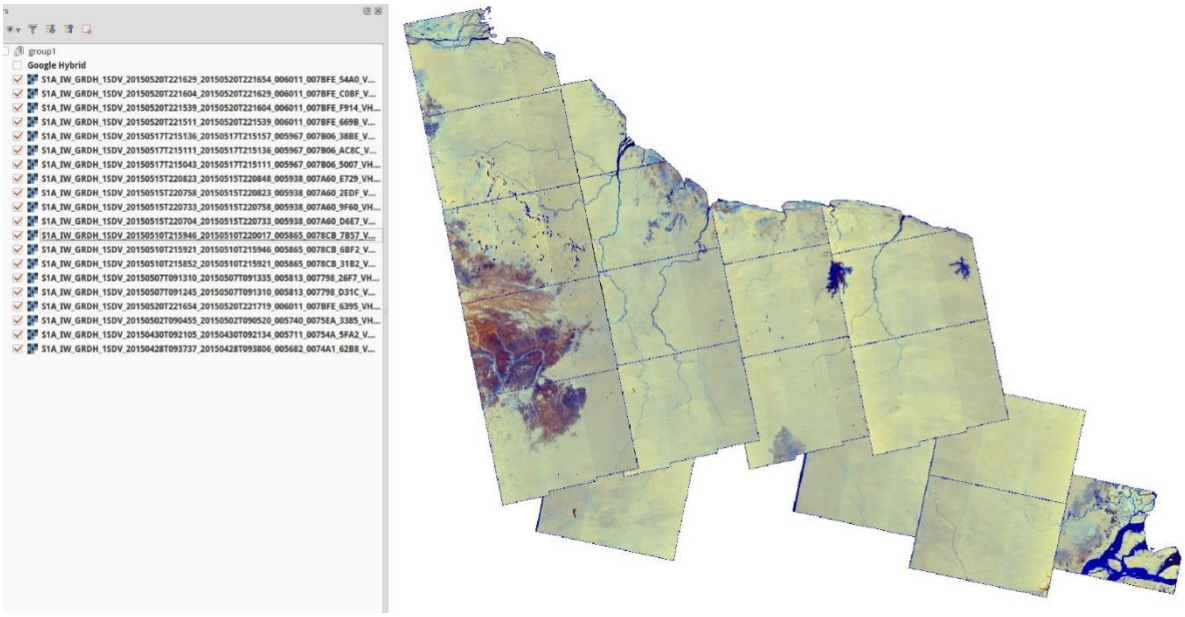
Sentinel-1 data are very heavy data (around 1Go per scene for GRD product level). Downloading and stocking the data can take a lot of time and require a lot of space for archiving it. This first step aims to provide to each partner one (or two if needed) external hard disk containing all Sentinel-1 data that was acquired by ESA. A QGIS project containing a Sentinel-1 catalog (such as the Spot and Landsat catalog created for the Gold mining study) will be created for organizing the data and facilitating the research of imagery within the database.

B. Delivery of one-date full Mosaic of preprocessed Sentinel-1 data

Making the processing of all available data will require a lot of time as several images covering the same area are already available. However, ready-to-be-used images (i.e. pre-processed images) covering the full territory for each partner would be very useful to ensure the short-term use and analysis of the Sentinel-1 data. Therefore, this second step aims to provide to each partner one mosaic of pre-processed images covering the full territory for one date (if possible, otherwise the smallest time window will be used). The pre-processing steps for each image include: a) Calibration, b) Multilooking to 20m, c) Radiometric correction, d) Orthorectification, e) Color composition process.

The mosaic will be available on the hard disk that will contain all raw data. This mosaic will be delivered with standard orthorectification process of Sentinel-1 data at 20m resolution in Tiff format including VV and VH polarization as shown in previous RADAR sessions (color composition - Red: VV

in decibel, Green: HV in decibel, Blue: difference between VH and VV in decibel). The figure below shows a rough example for a subset of the project area.



C. Delivery of tools to optimize the preprocessing production

Specific tools will be developed to optimize and automate as much as possible the pre-processing production chain. These tools will be delivered and free to be used in the future by all partners. This will allow them to be more efficient by spending less time to perform the mandatory pre-processing steps of the data. In addition, a helpdesk will be provided to solve any potential difficulties concerning installation or use of delivered tools.

D. Delivery of video tutorials to process raw Sentinel-1 data and use optimized tools

Video tutorials (such as the ones produced for the RADAR training sessions) will be delivered to help the operator to easily reproduce all pre-processing steps and to help them to use the optimized tools developed. This will enable the operators to be operational for further image processing if needed.

D. Demonstration of Sentinel-1 temporal analysis capabilities on dedicated study site

Preliminary tests will be performed on a specific study site where multi-temporal images are available to show the potential of Sentinel-1 data to monitor forest in time. Sites where changes occurred will be favored, such as where new shifting agriculture or gold mining took place.

E. Capacity building Workshop

In order to ensure the future operational production of Sentinel-1 data by each partner and to better understand the data (which has a different response from PALSAR data), we propose to organize a one-week workshop to consolidate what has been learned during the last workshop and applying it to Sentinel-1 data. Given the high amount of activities already planned and the coming end of the project, it will not be feasible to organize another workshop in the region. However, we propose that one staff from each partner go to Paris to meet the experts' team for a one-week workshop. During this week, the participants will have the opportunity to:

- Reproduce the pre-processing steps of Sentinel-1 data for a chosen image
- Use the optimized tools developed by the experts to enhance the production chain
- Compare and better understand the response of Sentinel-1 with ALOS data and optical data with the help of the experts
- Analyze and better understand the response of Sentinel-1 data for specific chosen areas of his territory with the help of the expert
- Perform multi-temporal analysis of Sentinel-1 data and better understand its potential for change detection and forest mapping
- Learn the use of SNAP software, the software developed by ESA to process all Sentinel data including the coming Sentinel-2

This workshop could take place in the ONFI office in Paris from <u>November 30 to December 4, 2015</u>

BUDGET

		Unit price	#	Total (euros)
Option 1	Tablet "SAMSUNG GALAXY TAB ACTIVE 8" SM-T360 16 GO BLACK"	400	20	8000
	Extra batterie	80	20	1600
Total option 1				9600
Option 2	External disk (2T)	100	4	400
	Production & workshop preparation			24000
	Workshop in Paris (1 pers/partner)	Logistic		10220
		Expertize		5600
Total option 2				40220
			Total	**59420**