ALOS

K&C Initiative
An international science collaboration led by JAXA

Wide Area K&C PALSAR Mosaic of Africa

Processing Issues and First Thematic Results

The Africa K&C PALSAR Mosaic

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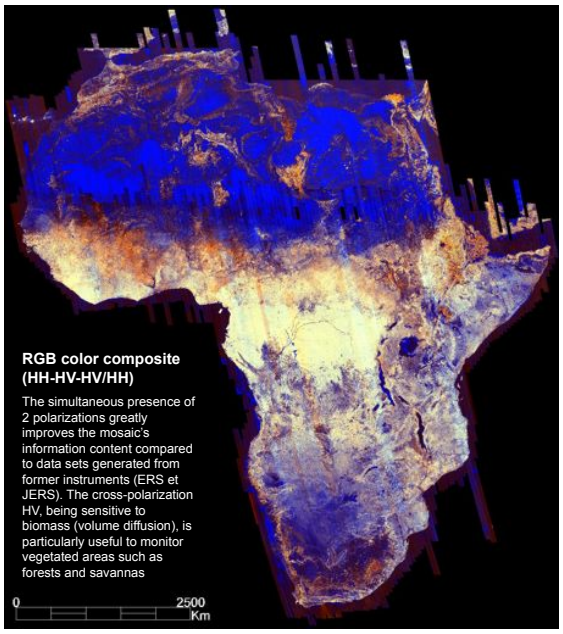
The mosaic provides a wall-to-wall high resolution coverage of the whole African continent.
It has been compiled by the JRC in the framework of the "**ALOS Kyoto & Carbon Initiative**" led by JAXA. It is composed of 319 ALOS PALSAR dual-pol long strip images, acquired mainly between June and August 2007.
The mosaic was geo-coded using SARscape software by SARMAP and a DEM derived from SRTM data. It is represented in a geodetic (lat, lon) coordinate system with 0.8333 millidegree pixel size.

PALSAR instrument aboard ALOS (JAXA)
L band (23.5 cm), HH and HV polarizations



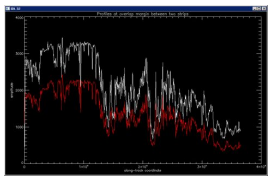
RGB color composite (HH-HV-HV/HH)

The simultaneous presence of 2 polarizations greatly improves the mosaic's information content compared to data sets generated from former instruments (ERS et JERS). The cross-polarization HV, being sensitive to biomass (volume diffusion), is particularly useful to monitor vegetated areas such as forests and savannas

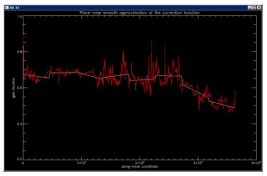
Processing Issues

Automatic radiometric revision to take into account seasonal variations, weather impact and calibration anomalies

Algorithm based on successive approximations minimization of the discrepancies between along-track amplitude profiles, estimated within the overlap areas at the margins of neighboring strips.



Along-track profiles estimated at the margin between two neighboring strips.



Piece-wise smooth approximation of the gain correction function.

Preliminary Analysis

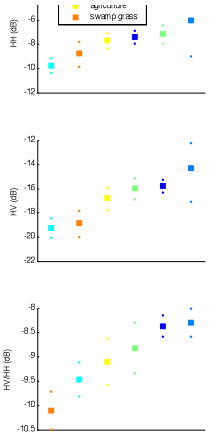
Objectives:

- assess the potential of PALSAR data for specific and/or localised applications (e.g.: monitoring mangroves, plantations, forest degradation).

- derive from the combination of the PALSAR mosaic and optical data a thematic map with focus on forests and savannas, and featuring standing biomass indicators.

Incipit:

Analysis of the HH and HV backscatter for several land use classes (i.e. primary forests, secondary forests, rural complex, swamp forests, savannas, mangrove) and class separability assessment.



The HV/HH polarisation ratio

The backscatter is sensitive to local slope. The automatic detection of land use classes based on HH and HV intensities only is therefore difficult in hilly or mountainous areas. To reduce the effect of topography, the HV/HH polarisation ratio can be used.

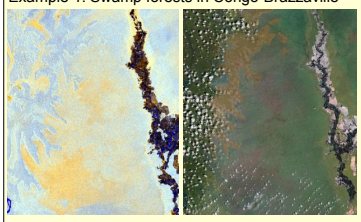

HH-HV-HH


HV/HH

Flooded forests

In L band data, the presence of free water under the canopy may increase (barring attenuation by the canopy) the HH backscattering by the double-bounce interaction between water and trunks, while the HV backscattering (mainly from the canopy) will not be modified. As a consequence, the HV/HH ratio decreases in flooded forests.

Example 1: Swamp forests in Congo-Brazzaville


HH-HV-HV/HH Google Earth

The different orange shades in swamp forests at the center of the image indicates the soil state: from very wet to flooded.
Logging roads are also distinguished in the primary forest on the left.

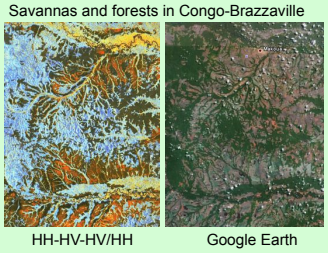
Example 2: Mangroves at the Cameroon-Nigeria border


HH-HV-HV/HH Google Earth

The radar distinguishes two types of mangroves (flooded in orange shades and non-flooded in blue shade), contrary to the optical data.

Savannas:

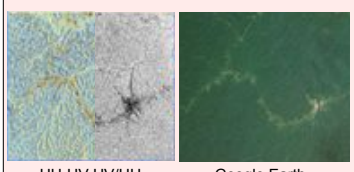
Savannas and forests in Congo-Brazzaville


HH-HV-HV/HH Google Earth

PALSAR images allow an easy separation of savannas and forests. Moreover, 2 types of savannas can be distinguished, woody savanna in orange and grassland in brown.

Secondary forests and rural complex:

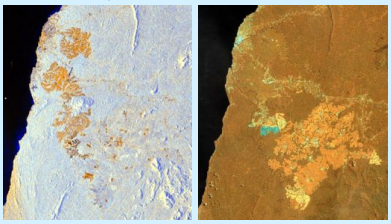
"Secondarized" region in south-east Cameroon


HH-HV-HV/HH Google Earth

The HV/HH polarisation ratio (right frame in the image) shows a distinction between the rural complex and the surrounding forest. A precise delineation seems however difficult so far.

Plantations:

Heveas and oil palm near Kribi, Cameroon


HH-HV-HV/HH ETM, bands 4-5-6

With PALSAR oil palm plantations are easily spotted (in orange, low HV), but hevea is not clearly distinguished from the neighbouring primary forest

On the other hand, for optical data, hevea plantations are well delineated, but not oil palm.

The two kinds of sensors are therefore complementary in this case.

Agenda:

THEMATIC	ANALYTICAL
- savanna standing biomass indicators	- influence of terrain elevation and morphology
- change map using the 1997 GRFM mosaic	- observations from optical sensors

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