THE K&C PALSAR AFRICA MOSAICS - 2007



Global coverage of the African continent with PALSAR observations at two polarizations (HH + HV), one date (mainly July-August)





THE K&C AFRICA PALSAR MOSAICS: FACTINOS

Compiled from 319 ALOS PALSAR dual-pol HH-HV slant range long strip images correlated by JAXA SigmaSAR processor, and acquired mainly between June and August 2007.

Strips geo-coded using SARscape software by SARMAP and a DEM derived from SRTM data.

Map coordinate system: geodetic (lat, lon) with 0.8333 10⁻³ Degree pixel size.

Radiometric correction for topography embedded into the classification step as a function of nominal incidence angle and terrain slope.

Data representation: backscatter amplitude HH or HV, 16 bit unsigned integer. RGB composite HH-HV-HV/HH 8 bit BIP.

Radiometric cosmetics: strips boundaries blending at pasting stage, strip balancing to account for seasonality and incidence angle effects.







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JRC global Africa DEM SRTM with auxiliary topographic data interpolation



Jarvis, A., H.I. Reuter, A. Nelson, E. Guevara, 2008, "Hole-filled SRTM for the globe Version 4, available from the CGIAR-CSI SRTM 90m Database: <u>http://srtm.csi.cgiar.org</u>.

Per strip **DEM tile extraction** Slant range calibrated strip data JAXA geographic data **DEM tiles data base**





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Northern Africa sub-mosaic





Western Africa sub-mosaic





Central Africa sub-mosaic





Southern Africa sub-mosaic





Seasonal effects

- PALSAR data acquired from June to August 2007 (85%)
- In Western Africa, the first weeks of June are still dry season, wet season starts around mid-June.



Radiometric correction: better visual aspect

Acquisitions in dry season (December-April) are recommended



Land cover mapping method - 1

Objective: classify the PALSAR mosaic into broad vegetation classes.

Supervised classification using training and validation data from JRC TREES-3 action.

TREES-3



- Systematic sampling every square degree
- 20km x 20km Landsat boxes
- Automatic classification revised by national experts





Land cover mapping method - 2



Planned classification scheme:

 $5^{\circ} \times 5^{\circ}$ tiles (up to 25 sample boxes)

In each tile:

- HH and HV signatures (pdf) of each land cover class (sample boxes)

- Class proportions using an ancillary global dataset

- Bayesian inversion





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Preliminary results – global scale









Preliminary results – mesoscale 2



Tile centered on $2.5^{\circ}S - 17.5^{\circ}E$

Border between the Congos Transition from tropical forest to savanna.



Preliminary results – local scale 1

 $1^{\circ}S - 16^{\circ}E$





Preliminary results – local scale 2





Preliminary results – local scale 3

 $3^{\circ}S - 16^{\circ}E$





Woodland and savanna biomass - 1



A joint effort by:

EC Joint Research Center Aberystwyth University, UK University of Edinburgh, UK Tropical Research Institute (IICT), Portugal

Relying on some 2700 field measurements

Very heterogeneous dataset:

- Wide range of biomes (grassland to primary forest)
- Variable geolocation accuracy
- Variable biomass accuracy because of different methods (allometric equations from field measurements, canopy cover converted to biomass...)



Preliminary analysis:



Very high dynamic range:

>15dB from 0 to 100 T/ha

- Very high "noise" in relationship But:
- Biomass data are (very) inaccurate and need to be sorted out
- The PALSAR mosaic still has to be corrected for soil moisture and seasonal effects

So... There is hope!



An international science collaboration led by JAXA

Product Delivery Report for K&C Phase 2

ALOS

Gianfranco De Grandi Alexandre Bouvet European Commission DG Joint Research Center

Science Team meeting #15 JAXA TKSC/RESTEC HQ, Tsukuba/Tokyo, January 24-28, 2011

K&C deliverables

An international science collaboration led by JAXA

Papers and Reports

1. Published (please provide PDF file)

K&C Phase-1 report

LOS

- 1 contribution to K&C Booklet
- De Grandi, G.F.; Lucas, R.M.; Kropacek, J., "Analysis by Wavelet Frames of Spatial Statistics in SAR Data for Characterizing Structural Properties of Forests", IEEE Transactions on Geoscience and Remote Sensing, Volume: 47, Issue: 2, 2009.
- Rosenqvist, A.; De Grandi, F., "The ALOS PALSAR mosaic over the African continent A reference baseline dataset for forest- and land cover change monitoring", IEEE International, IGARSS Geoscience and Remote Sensing Symposium, 2009, Volume: 5, Page(s): V-115 V-117.
- Gianfranco De Grandi, Alexandre Bouvet, Richard Lucas, "Wide Area K&C PALSAR Mosaics: Processing Issues and First Thematic Results", Proc. EUSAR10 Conference, Aachen, Germany, 7-10 June 2010.

2. Submitted/in preparation

• De Grandi GF., Bouvet A., Lucas R., Shimada M., Monaco S., Rosenqvist A., "The K&C PALSAR mosaic of the African continent: processing issues and first thematic results", IEEE Transactions on Geoscience and Remote Sensing (submitted Sep. 2010)

K&C deliverables

K&C Initiative

An international science collaboration led by JAXA

Data sets and Thematic products (mosaics, classification maps etc.)

- 1. Completed and Delivered to JAXA
- Northern Africa HH-HV mosaic
- West Africa HH-HV mosaic

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- Central Africa HH-HV mosaic
- South Africa HH-HV mosaic

2. Completed, but not yet delivered (please deliver ASAP)

3. To be completed during 2011

- Pan-African land cover map
- Woodland and savanna biomass map