ALOS

K&C Initiative

An international science collaboration led by JAXA

Inundation mapping in the Congo River Basin

Mid-term results

Background

The Congo River Basin is the second largest watershed in the world, covering an area of about 3.8 million km^2. The floodplain is subject to a seasonal inundation cycle in which extensive forest areas are flooded on a regular basis, and as such, constitutes a significant source of non-anthropogenic GHG emissions to the atmosphere. The magnitude and variability of these emissions are largely unknown due to the lack of adequate measurement techniques to map below-canopy flooding.

Objectives

The objective of this K&C project is to use ALOS PALSAR data mode to **map and monitor the spatial extent and temporal dynamics of flooding in the Congo Basin**, using ScanSAR (WB1) path data, processsed by JAXA EORC. In advance of the path data processing, initial anaalysis and prototype classification were undertaken on a time series of standard product ScanSAR data, covering the central part of the Congo river basin.

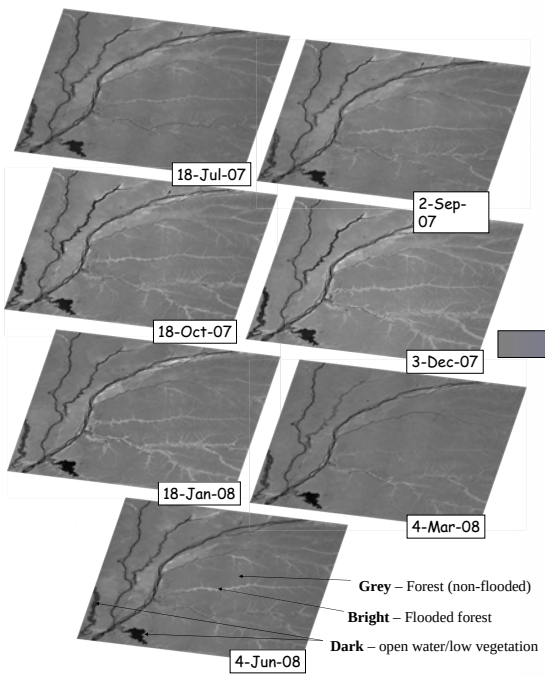
RSP 271 Frame 3600

Approach

Input data: PALSAR ScanSAR (WB1), EOC standard product Level 1.5. 7 out of 8 possible observations, acquired every 46-days between July 2007 and June 2008 (May 2008 missing).

Radiometric calibration: Based on the assumption that the backscatter for non-flooded forest remains stable over time, the absolute radiometric calibration accuracy of the WB1 data available was estimated using 20 forest reference points distributed across the range in each of the scenes (~0.42 dB). A calibration factor was then applied to each scene for normalisation to a common reference.

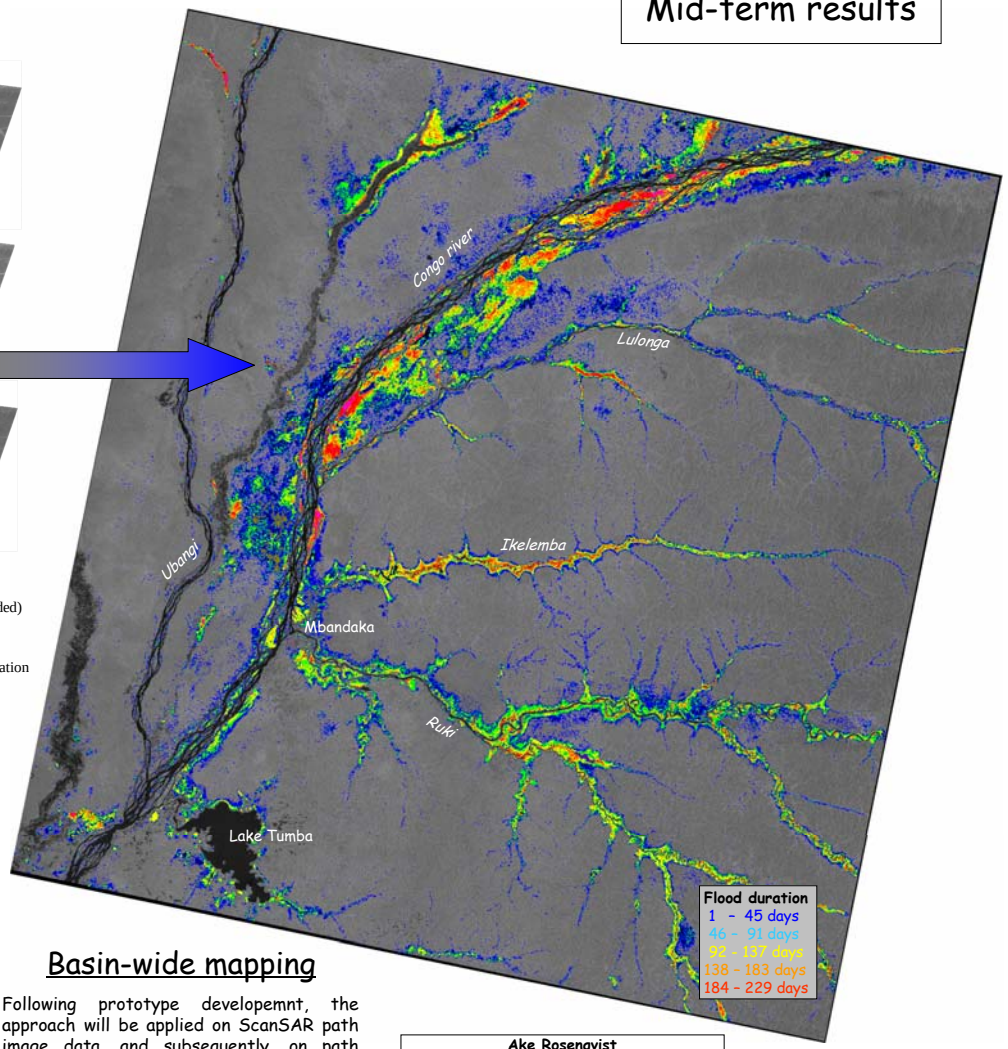
Classification: Preliminary classification of flooded vs. non-flooded forest was undertaken by a simple threshold method, applied on each of the normalised scenes Since no in-situ data over the Congo were available, a threshold value of -4.6 dB was used (verified valid for flooded forest in the Amazon in JERS-1 SAR data). Solitary pixels were removed by a 3x3 median filter.



Results

Due to the lack of ground truth information on flooding in the Congo Basin, it is acknowledged that the threshold method yields large uncertainties in the area estimations which cannot be verified, and that a more sophisitcated classification method - possibly based on backscatter changes – therefore may need to be applied. The prototype flood duration map to the right nevertheless illustrates the unique potential of using PALSAR ScanSAR data for flood duration mapping:

* L-band HH-polarisation
* Flooded forest is detectable across the entire 360 km image range (18-43 deg)
* Systematic observation strategy implemented for ALOS PALSAR, observing globally significant wetlands every 46-day cycle.



Basin-wide mapping

Following prototype developemnt, the approach will be applied on ScanSAR path image data, and subsequently, on path image mosaicks covering the full Congo basin.

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