ALOS

K&C Initiative

An international science collaboration led by JAXA

Amazonian Wetlands Mapping with ALOS PALSAR:

First KC ScanSAR Product for the Central Amazon

Project Objectives

Maps of wetland extent, vegetation type, and inundation periodicity are being produced for the Amazon Basin at ~90 m resolution using a combination of ALOS K&C Fine-beam and ScanSAR strip data. ALOS PALSAR is currently **the only** earth satellite that can provide regional mapping of seasonal inundation patterns of tropical wetlands at this resolution.

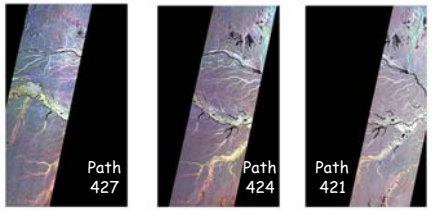
Results

Terrain-corrected, co-registered, multi-temporal ScanSAR strips were provided by the KC Mosaic Theme (B. Chapman, JPL) for three central Amazon paths extending from 2°N to 8°S. For each strip, an image segmentation was performed using multi-temporal mean ScanSAR amplitude and the SRTM DEM. A rules-based classification was applied, incorporating slope, local incidence angle, and multi-date and single-date image statistics.

The results clearly illustrate the capability of ALOS ScanSAR to capture regional variability in the extent and timing of inundation. During 2010, KC Fine-beam strips will be incorporated into the classification algorithm, and products will be validated.

These products will be publicly available through a web interface and will be used in 2010 for studies on methane emissions (**Carbon**), comprehensive regional mapping of wetland habitats (**Conventions**), and habitat management studies for particular species (**Conservation**).

KC ScanSAR Strip Data Inputs

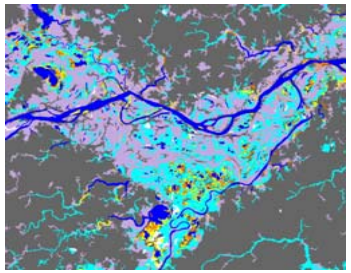


ScanSAR Path	Dates
421	20061104, 20070507, 20070622, 20070807, 20080509, 20080809
424	20061109, 20070512, 20070627, 20070812, 20070927, 20071112, 20071228, 20080514, 20080629, 20080814, 20080929
427	20061114, 20061230, 20070401, 20070517, 20070702, 20070817, 20080102, 20080704, 20080819, 20081004

Other Data Inputs:

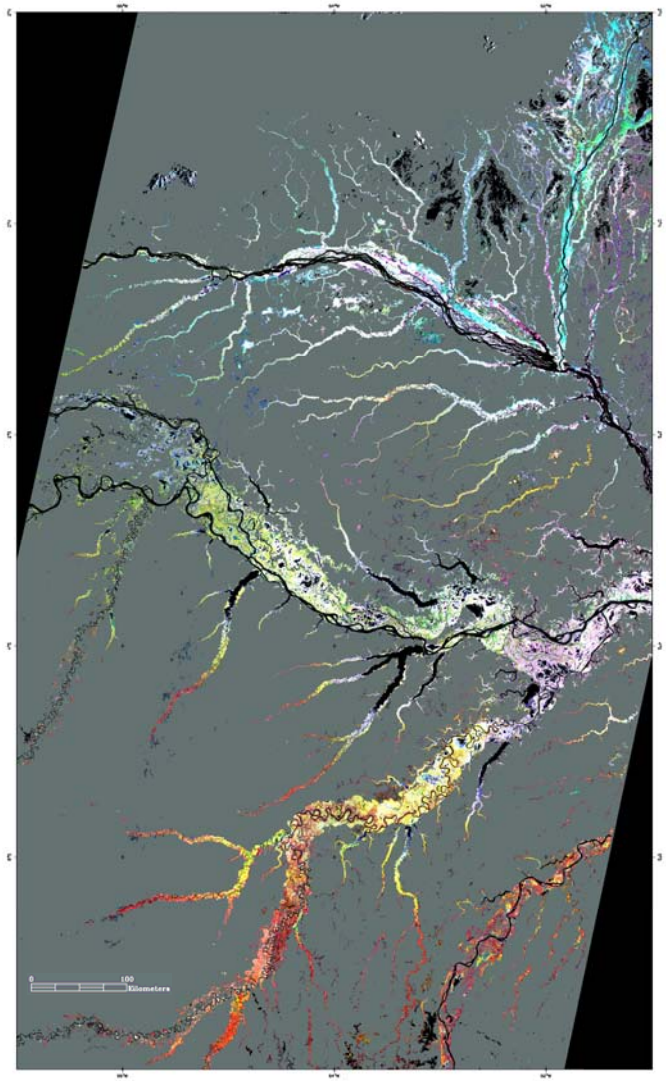
SRTM (CGIAR) Height and Slope

Local incident angle (Gamma software)



Example of ScanSAR product for Piagaçu-Purus Reserve, Brazil.

Open water
Aquatic macrophyte
Shrub
Non-wetland
Forest, flooded 1-2 m/a
Forest, flooded 3-6 m/a
Forest, flooded > 6 m/a



ScanSAR-derived map of wetland extent, central Amazon. Non-wetlands shown in gray. Wetlands are displayed as color composite of mosaicked ScanSAR from May 2007 (R), June-July 2007 (G), and August 2007 (B).

Validation Datasets

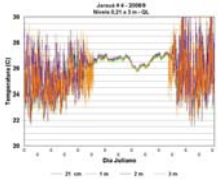
No single validation dataset is sufficient to reliably estimate errors in mapped wetland extent, vegetation structure, and inundation state. Parallel approaches have therefore been developed for each element.

Aerial Imaging and Laser System

In 2010, an aerial campaign will acquire very high-resolution multi-spectral image data and laser profiles along transects at ALOS K&C focus sites in the Brazilian Amazon, using a new system that will fly on the INPE Bandeirante. These datasets will be made available with map products.

Thermochron iButtons

A proof-of-concept experiment during the 2008-2009 flood season showed that Thermochron temperature sensors can be used to gauge inundation period at remote floodplain locations. Funding is being sought for further installations during 2010-2011.



Diurnal temperature response, 11/2008 – 10/2009, for 4 iButton sensors at várzea site in Mamirauá Sustainable Development Reserve. Damped signal indicates sensor was submerged.

Graph: R. Gielow, INPE

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Collaborators

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