



THE WOODS HOLE RESEARCH CENTER

149 Woods Hole Road · Falmouth, MA 02540-1644 USA
Telephone 508.540.9900 · Fax: 508.540-9700 · www.wbrlc.org

Woods Hole Research Center Debuts First-of-its-Kind Image Mosaic

Global forest monitoring from space to be strengthened

[Click here to download pdf version of ALOS/PALSAR mosaic of the Xingu river basin, Brazil \(12MB\)](#)

Much of the discussion at the upcoming United Nations Climate Change Conference in Bali, Indonesia, will focus on monitoring tropical deforestation and the critical role that remote sensing systems will play in the development of REDD (Reduced Emissions from Deforestation and Degradation) mechanisms – policies designed to compensate rainforest nations for avoiding deforestation. Using synthetic aperture radar (SAR) data acquired over a six-week period by the Japanese Advanced Land Observing Satellite (ALOS), scientists at the Woods Hole Research Center have just completed the first-of-its-kind, large-scale, wall-to-wall image mosaic at 25 m resolution for a portion of the Amazon basin spanning some 400,000 square kilometers. Images acquired globally over narrow timeframes provide for true “snapshots” of deforestation activities, giving leverage to monitoring programs that hinge on timely and accurate observations of forests throughout the world.

Dr. Josef Kellndorfer, who is leading the project for the Center, says, “The Japanese Space Agency JAXA has launched an amazing sensor which exhibits unprecedented geometric and radiometric accuracies allowing us to generate high quality cloud free radar image mosaics with nearly no user interaction required. The ALOS observation plan will ensure that these high-resolution data are acquired several times per year for years to come. With a strong sensitivity of the ALOS radar imaging sensor to vegetation structure, this marks a new era in remote sensing of natural resources.”

The image mosaic is a composite of 116 individual scenes acquired by the Phased Array L-Band SAR (PALSAR) carried on board ALOS. The acquisition was made over the Xingu basin in Mato Grosso, Brazil, between June 8 and July 22, 2007. From the mosaic, Dr. Kellndorfer’s group has generated a preliminary land cover classification with emphasis on producing an accurate forest/nonforest map. In the forested areas, the sensitivity of the PALSAR data to differences in aboveground biomass is also being investigated in collaboration with the Amazon Institute of Environmental Research (IPAM).

“The area that is mapped with the mosaic of images centers on the headwaters of the Xingu River, one of the Amazon’s mighty tributaries. The indigenous groups, soy farmers, smallholders, and ranchers that live in this region are top candidates to receive payments for reducing their carbon emissions. Where this has previously taken us several months to prepare, this new mosaic took only a few days, a turnaround window that carries real significance.” says Woods Hole Research Center senior scientist Daniel Nepstad.

The mosaic marks the dawn of a new era in global Earth observation because it demonstrates the unprecedented ability of the ALOS/PALSAR to deliver high-resolution (~20 meters), regional- to continental-scale image acquisitions over narrow time frames (6-8 weeks) and through dense cloud cover and precipitation.

Ake Rosenqvist, who was instrumental in the design of the ALOS/PALSAR observation strategy at JAXA points out that “given the regional-scale nature of climate change and environmental degradation, the importance of undertaking systematic observations cannot be overly emphasized. With this in mind, the PALSAR observation strategy has been designed to provide consistent, wall-to-wall observations at fine resolution of all land areas on the Earth on a repetitive



THE WOODS HOLE RESEARCH CENTER

149 Woods Hole Road · Falmouth, MA 02540-1644 USA
Telephone 508.540.9900 · Fax: 508.540-9700 · www.wbrdc.org

basis, in a manner that has earlier been conceived only for coarse and medium resolution instruments. ALOS is a pathfinder in this context and we hope that other space agencies and satellite providers will follow suit.”

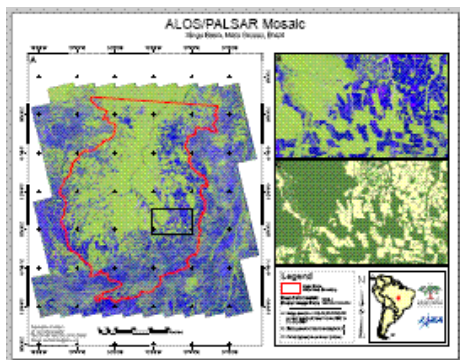
Masanobu Shimada, who is the ALOS Science Project Manager at JAXA, states, “We are very pleased to have ALOS in orbit and operating exceptionally well. One of the main objectives of the ALOS mission is to support global forest monitoring needs. We are excited to see that the data are now being acquired operationally, and that important scientific results can be produced.”

Dr. Kellndorfer officially unveiled this new product at the international ALOS Principal Investigator symposium in Kyoto, Japan, on Monday, November 19. The mosaic and the implications of ALOS as an additional global forest monitoring tool for REDD negotiations at the UNFCCC meeting in Bali are being shared with NGOs, governments, policymakers, and other organizations prior to the conference so that the findings can be included in preparations and proposals.

Information on the ALOS missions and the PALSAR sensor are available at <http://www.eorc.jaxa.jp/ALOS/index.htm>

Funding for this work was obtained from the Linden Trust for Conservation, Joseph H. Gleberman, and the Summit Foundation. Image data were obtained from the Alaska Satellite Facility under a NASA/JAXA data sharing agreement. ITTVIS/SARMAP and PCI Geomatics supported image processing.

The Woods Hole Research Center is dedicated to science, education and public policy for a habitable Earth, seeking to conserve and sustain forests, soils, water, and energy by demonstrating their value to human health and economic prosperity. The Center has initiatives in the Amazon, the Arctic, Africa, Russia, Asia, Boreal North America, the Mid-Atlantic, and New England including Cape Cod. Center programs focus on the global carbon cycle, forest function, landcover/land use, water cycles and chemicals in the environment, science in public affairs, and education, providing primary data and enabling better appraisals of the trends in forests.



One of the greatest threats to the Amazon rainforest is the rapid expansion of industrial agriculture, and rates of deforestation are likely to increase in the coming decades as demands for biofuel and animal feed increase.

Scientists at the Woods Hole Research Center are actively involved in the development of policy mechanisms focused on compensating rainforest nations for slowing deforestation, thereby reducing their emissions from heat-trapping green house gases. As part of this effort, Dr. Josef Kellndorfer and his colleagues are investigating the latest spaceborne remote sensing technologies for monitoring tropical deforestation, including a new Japanese radar sensor, the Phased Array L-Band Synthetic Aperture Radar (PALSAR), carried on board the Advanced Land Observing Satellite (ALOS). Using data from the ALOS/PALSAR, Dr. Kellndorfer's group has produced the first-of-its-kind, large-scale, wall-to-wall image mosaic for a portion of the Amazon basin (see A in PDF above). Launched in 2006, the ALOS/PALSAR will deliver annual pan-tropical image acquisitions over short time frames (~3 months) and through dense cloud cover and precipitation.

These characteristics make ALOS data ideally suited for reducing current uncertainties associated with quantifying forest loss and agricultural expansion (see B and C in PDF above) across the tropics.