Satellite Radar Technology Helps Protect Forests

The long-term rise in atmospheric and ocean temperatures has become a serious issue, triggering climate changes over the entire earth. One of the causes of global warming is the increase in carbon dioxide (CO_2) emissions, of which forest logging and other changes in land use account for about 11% of the global total. "Stopping unplanned and illegal logging in tropical forests is also crucial as a measure against climate change," says Kanako Adachi of the Japan International Cooperation Agency (JICA).

Japan has been playing a leading role in creating a new international framework to reduce CO_2 through the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP), and Brazil requested its assistance in dealing with the problem of illegal logging in the Amazon basin.

In response to this request, JICA and the Japan Aerospace Exploration Agency (JAXA) conducted a project from 2009 through 2012 to preserve the Amazon's forests and prevent illegal logging using observational data from the Advanced Land Observing Satellite *Daichi* (ALOS). Before that Brazil had monitored its forests using satellite-borne optical sensors, but the cloud that covers the Amazon basin for more than five months of the year limited the system's effectiveness. The JICA-JAXA project, in contrast, used radar employing microwaves from ALOS. This system was able to monitor the earth's surface even when it was covered with clouds or during the night. JICA and JAXA did not limit their role to providing data; they also sent four experts from Japan to develop software to analyze logging areas from satellite images. They then trained local personnel in this technology, building a system so that monitoring of changes in forests using ALOS could be done with local efforts only. This combination of Japanese assistance and local efforts proved effective, detecting more than 2,000 illegal logging operations and decreasing the area being illegally logged by 40%.

As Adachi explains, "JICA then collaborated with JAXA to launch a new project, the JICA-JAXA Forest Early Warning System in the Tropics [JJ-FAST], which uses this system to constantly monitor tropical forests around the globe with *Daichi-2* [ALOS-2], the successor to ALOS. It's revolutionary in that changes detected in the forests can be viewed by anyone on the Web free of charge."

The first data to be released under this project was that for five Latin American countries in November 2016. The target areas will be expanded in stages to African and Asian regions. Ultimately, the aim is to make data publicly available for about 80 countries that have tropical forests.

"At the 2015 United Nations Climate Change Conference [COP 21] in Paris, the Japanese government announced that it would undertake the Forest Governance Initiative, and JJ-FAST is at the core of this effort," says Adachi. "We hope we can keep contributing to the protection of people's livelihoods through the use of Japanese technology in solving problems on a global scale."

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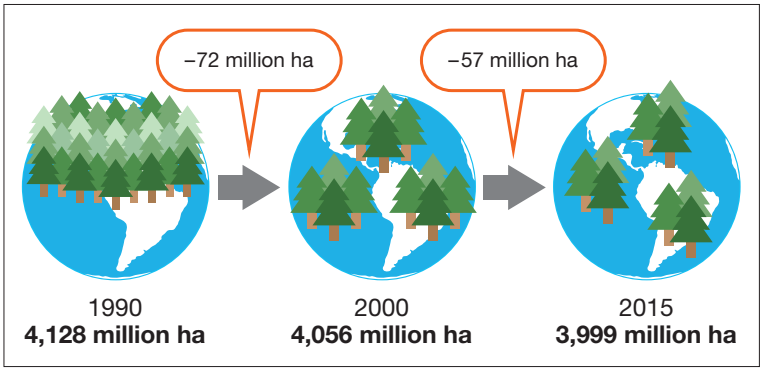
ALOS-2 is used in a wide range of fields including map-making and regional observations, assessment of disaster situations, and resource exploration.

JICA-JAXA Forest Early Warning System in the Tropics: JJ-FAST
http://www.eorc.jaxa.jp/jjfast

Protecting the Amazon Forest with Japanese Technology in Brazil
https://youtu.be/ZXefT9Wr1IY

Changes in the world's forested land (hectares)



Souce: Global Forest Resources Assessments.

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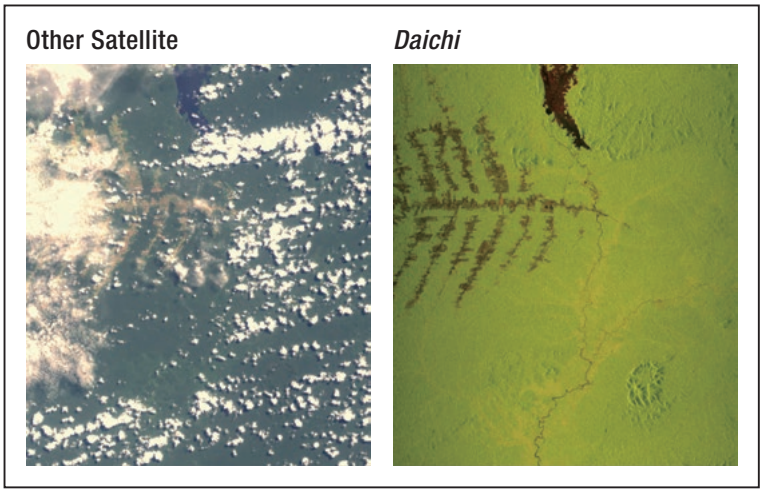

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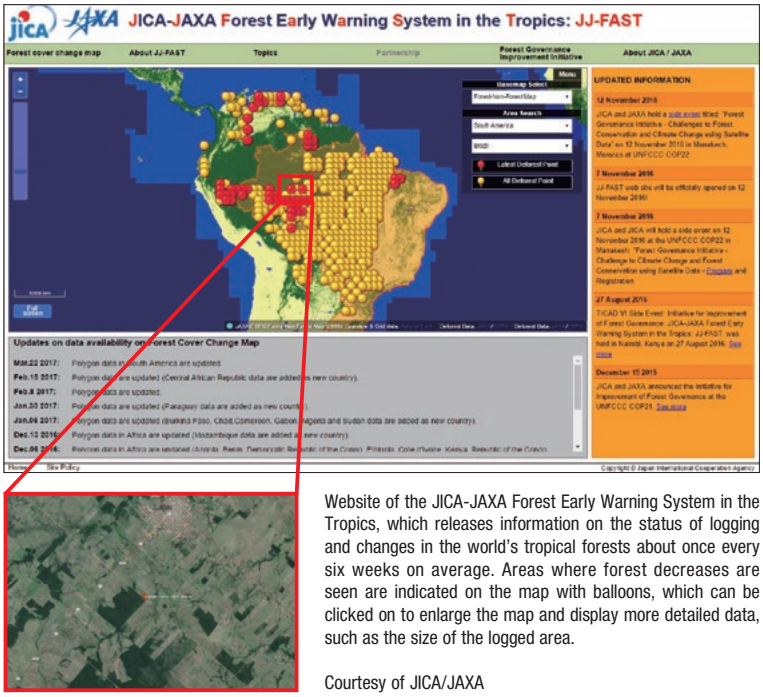
1. Thanks in part to cooperative international efforts, the pace of the decrease in the world's forested land area has been slowing, but considerable amounts of forest area continue to be lost every year. 2. Site photo of forest logging in the Amazon region discovered by *Daichi*. The loss of tree cover makes land susceptible to floods and soil erosion, impacting people's lives. 3. Two satellite images of the same region: The image on the right, taken from *Daichi* using synthetic aperture radar, shows the surface underneath the clouds.

JICA-JAXA Forest Early Warning System in the Tropics (JJ-FAST)



Website of the JICA-JAXA Forest Early Warning System in the Tropics, which releases information on the status of logging and changes in the world's tropical forests about once every six weeks on average. Areas where forest decreases are seen are indicated on the map with balloons, which can be clicked on to enlarge the map and display more detailed data, such as the size of the logged area.

Courtesy of JICA/JAXA

Kanako Adachi

Inaugural project officer of the Project on Utilization of ALOS Images to Support Protection of the Brazilian Amazon Forest and Combat against Illegal Deforestation. Currently oversees the JICA-JAXA Forest Governance Initiative as director, Natural Environment Team 2, Forestry and Nature Conservation Group, Global Environment Department, JICA.