Linking Forest & Carbon Monitoring, Ecosystem Function and Disaster Monitoring

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CSIRO

GEO TASK on Forest Mapping and Carbon Tracking

A New GEO sub-Task in WP 2009-2011

Leads: Australia (Department of Climate Change & CSIRO)
Japan (JAXA, NIES)
Norway (NSC)
CEOS
FAO
GTOS (GOFC-GOLD)

Sub-task Number: CL-09-03b
Overarching GEO Task: Global Carbon Observation and Analysis System

GEO Area: CLIMATE
Related GEO Communities of Practice: Carbon Cycle (former IGCO) and Forest

International Context

- Initiative supports political requirements related to the UNFCCC negotiations in relation to reduction of emissions from deforestation
- Window of opportunity for political attention towards COP-15 in Copenhagen end 2009
- Unique opportunity for GEO, CEOS and the forest community to demonstrate capability to develop a consistent, long-term forest carbon monitoring system

Typical forest change & routine monitoring requirements

Type of clearing	Characteristic size	Characteristic temporal cycle
Selective logging	Gaps < 30 x 30 m	30-80 yrs
Clear-cut logging	> several ha	80 yrs
Shifting cultivation	Small fields, < 6 ha	5-10 yrs
Small-holder agriculture	Small fields, < 6 ha	Permanent until abandoned
Intensive mechanized agriculture	> 100 ha	Permanent until abandoned
Urban growth, or other uses	Ranging from small settlements to urban expansion	Permanent until abandoned

Source GOFC-GOLD

GEO Task Objectives

Ultimate Goal: Establishment of a coordinated operational network of national systems and associated regional demonstration/reference test-sites, using similar input satellite data and agreed methodologies, to demonstrate forest-change monitoring capability, in support of climate policy needs

To support this goal, the task objectives are:

- **Consolidation of observational requirements and associated products, ultimately leading to an annual, mid-resolution global forest-change monitoring program.**
- **Coordination of observations, including securing their continuity**
- **Coordinated assessment of tools and methodologies**
- **Coordination of the production of reference datasets**
- **Improvement of access to observations, datasets, tools and expertise and associated capacity building activities.**

Proposed Guidelines for Establishment of Test Sites and Recognition by GEO Task (2)

- Sites should be located in countries with own stated intent to develop national forest carbon monitoring systems, and requiring capacity building support
- Donor countries and/or donor NGO's clearly identified
- Countries with proposed test-sites and their government institutions having commitment for capability to support ground observations
- Relevant national forest management authorities in host countries being involved
- Clear management and governance arrangements being outlined
- Resources for the acquisition and analysis of the data clearly identified
- Timely and specified reporting on progress and deliverables, including specific data products, for each site

Proposed Guidelines for Establishment of Test Sites and Recognition by GEO Task (3)

- Initial focus will be on cloud-affected areas with active deforestation – aforestation activities
- Large areas (to demonstrate repetitive, wall-to-wall, accurate wide-area forest mapping capabilities - e.g. Borneo)
- Sites to include representative scientific projects on forest change, with appropriate in-situ observations
- Availability of archived SAR and optical data to demonstrate changes is preferred

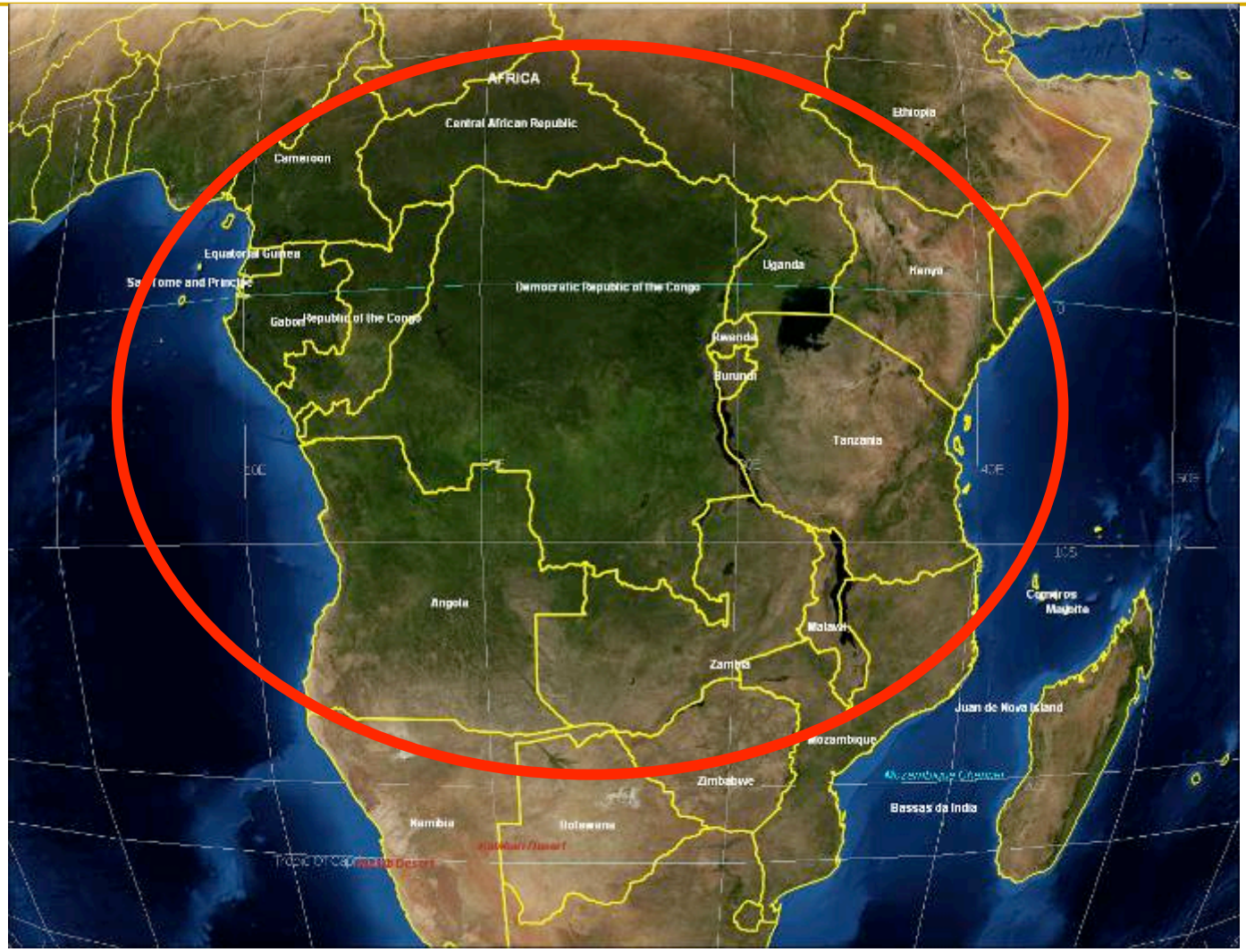
Initial preference will be given to large-extent tropical sites, and/or sites with cloud-cover constraints and with active land cover change

Nominated Initial Test-sites

- Amazon region in Brazil
- Borneo, with focus on the Indonesian part
- Tanzania, with focus on mountain forest
- Tasmania (Australia)
- Additional sites to be defined by UN REDD (FAO)
- Utilise synergy with CEOS LSI Constellation regional areas

Note: Final area and coverage of each regional test-site is being finalised in conjunction with key countries and governments.

Initial Focus Areas (1)
- Africa -



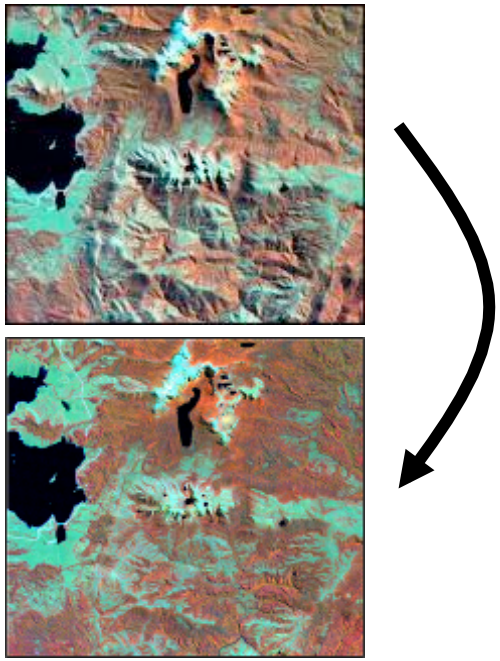
Initial Focus Areas (2)
- SE Asia -

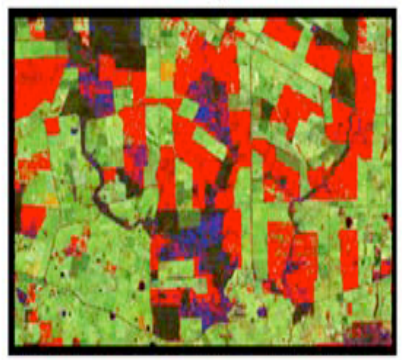
Initial Focus Areas (3) – South America -

Australian Methodology Development
Focus Area: Tasmania

Current NEEDS: Development of Methods for production of repeatable Land-Cover Products

- Needed: Standard methods of pre-processing into annual, orthorectified, terrain illumination-corrected mosaics (optical & SAR).
- <u>Needed: Methods for production of Information Products (Annually @ 25 m resolution)</u>
  - Priority 1: Forest, Non-Forest
  - Priority 2: Forest Degradation
  - Priority 3: Land-use (e.g. agriculture, plantations, native forest)
    - Forest class: Softwood, hardwood, native
    - Plantation type mapping pre- and post-1990
  - Priority 4: Sparse woody perennial extent



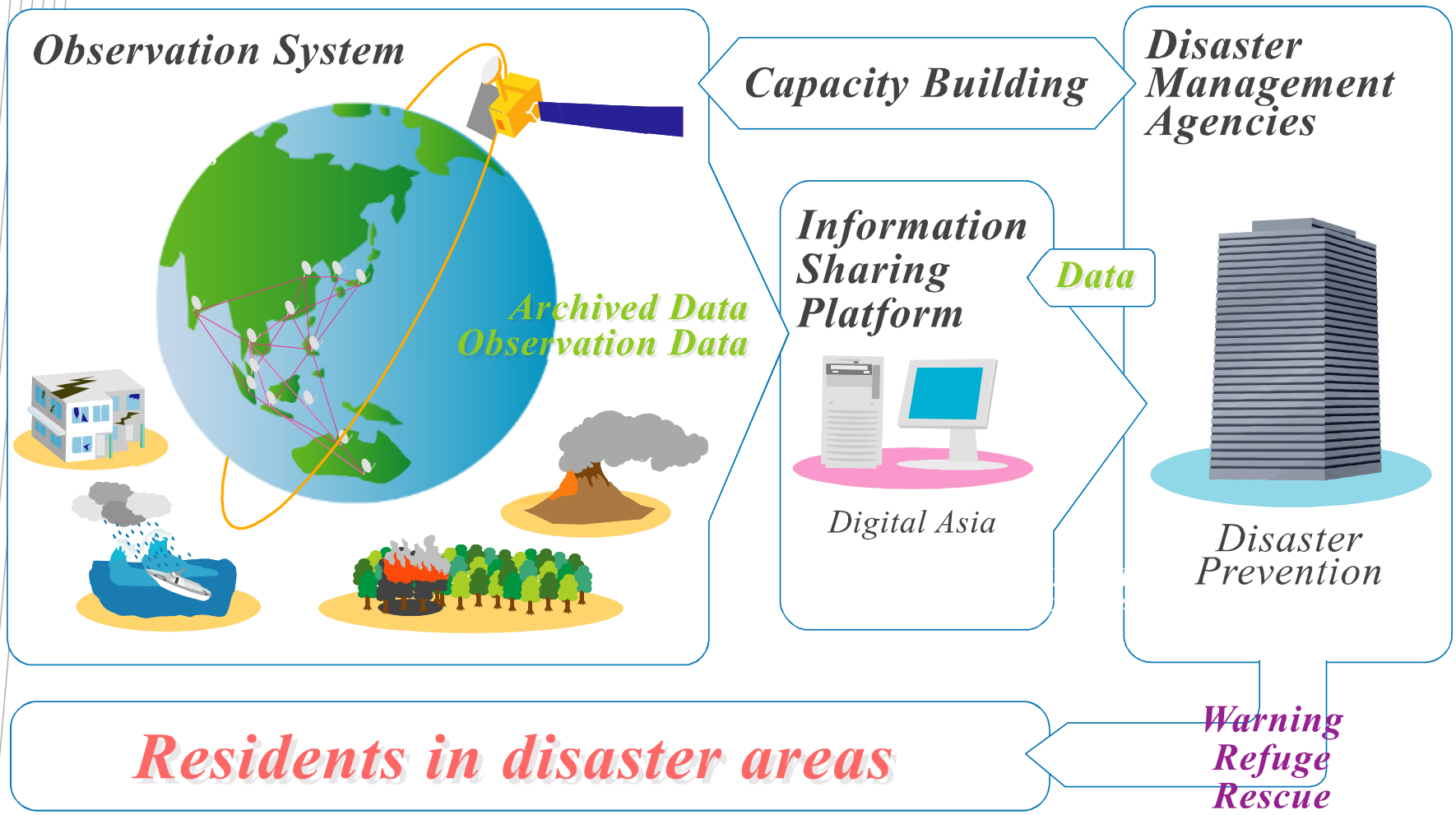


Task Outputs/Deliverables

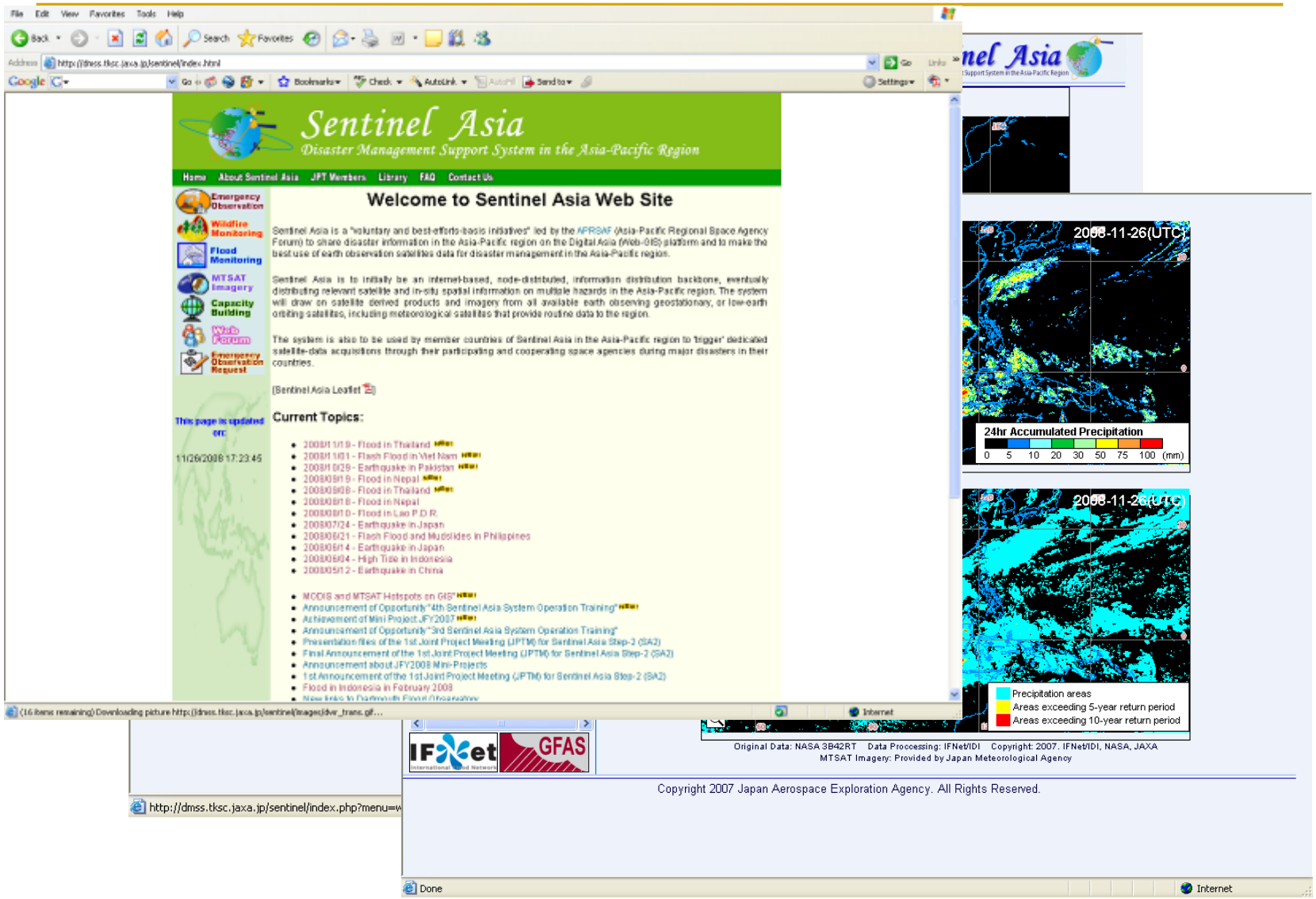
1. Regional reference test-sites established in consultation with national governments, NGO's and expert teams.
2. Optical + SAR data acquisition strategy agreed and established via CEOS agencies
3. Optical + SAR datasets routinely provided by space agencies, initially over reference sites
4. Satellite data processing, accuracy assessment and correction methods widely agreed and documented through a mid-term task report
5. Provision of in-country access to observations, datasets, tools and expertise and associated capacity building activities.
6. Establish annual, mid-resolution global forest-change monitoring program
7. Forest change data products agreed and being routinely produced, by national/regional programs, together with associated accuracy metrics.

Part 2.
Synergies with other Information Services eg. Sentinel Asia

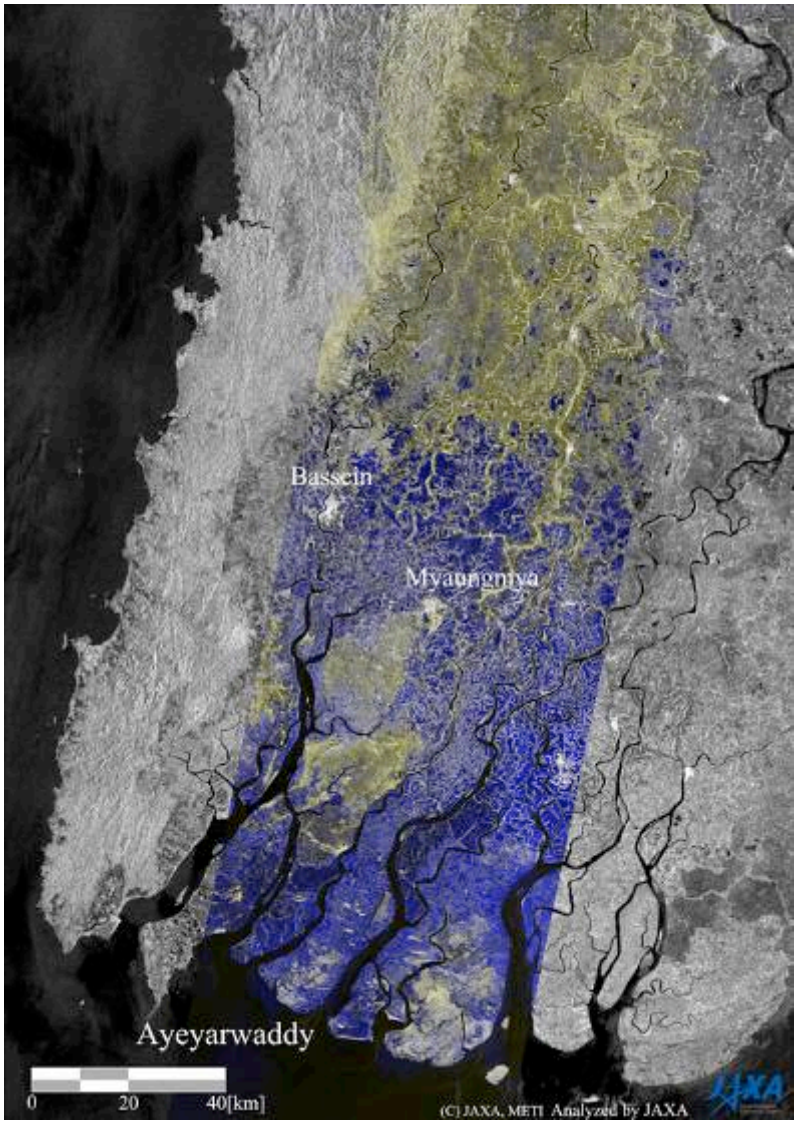
Concept of Sentinel Asia

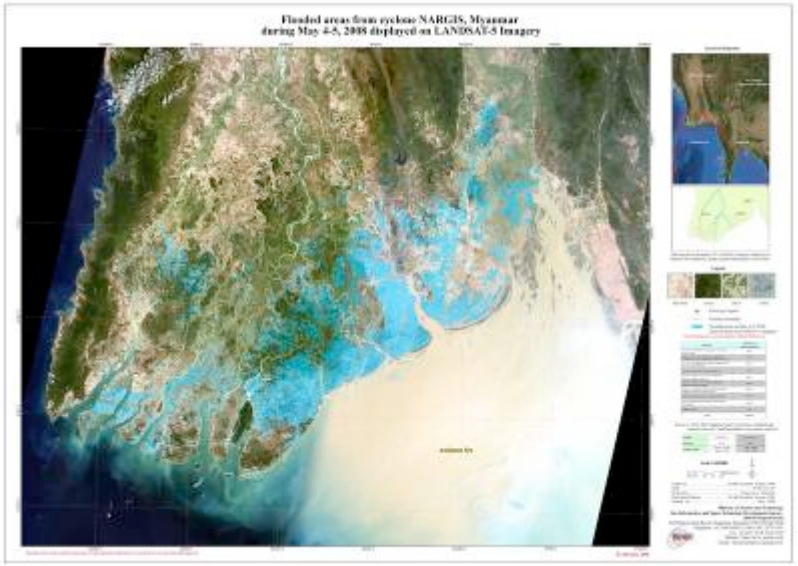


Sentinel Website: Operational since 2006



Myanmar – Cyclone Nargis

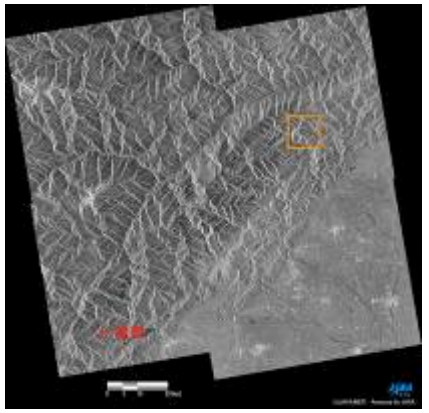


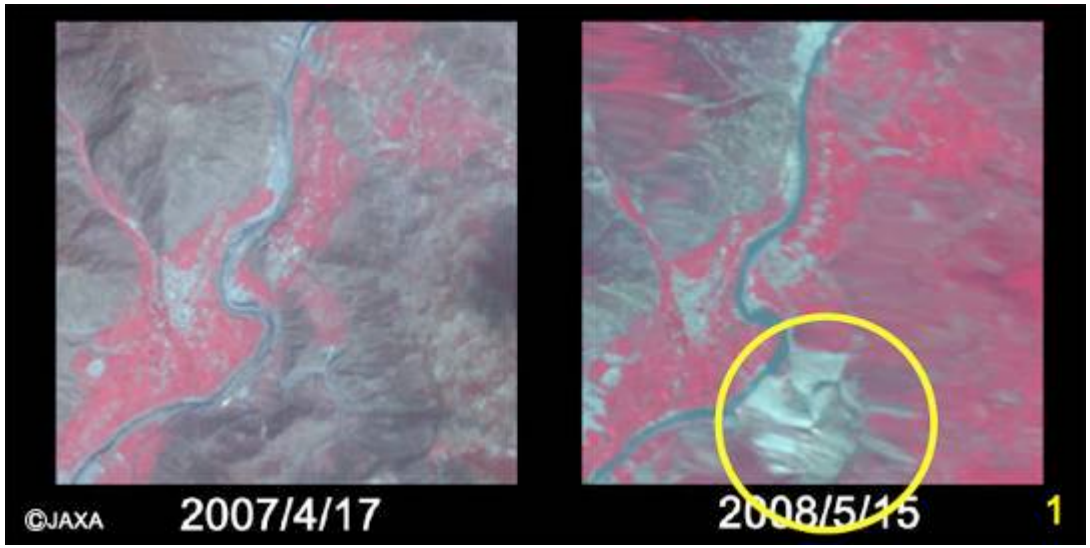


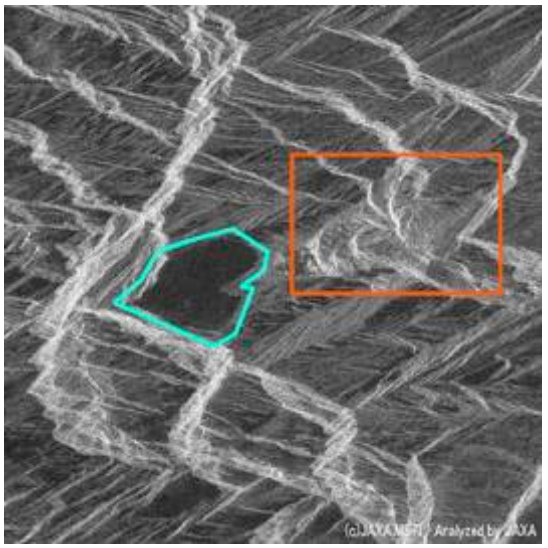
GROUP ON EARTH OBSERVATIONS

CEOS

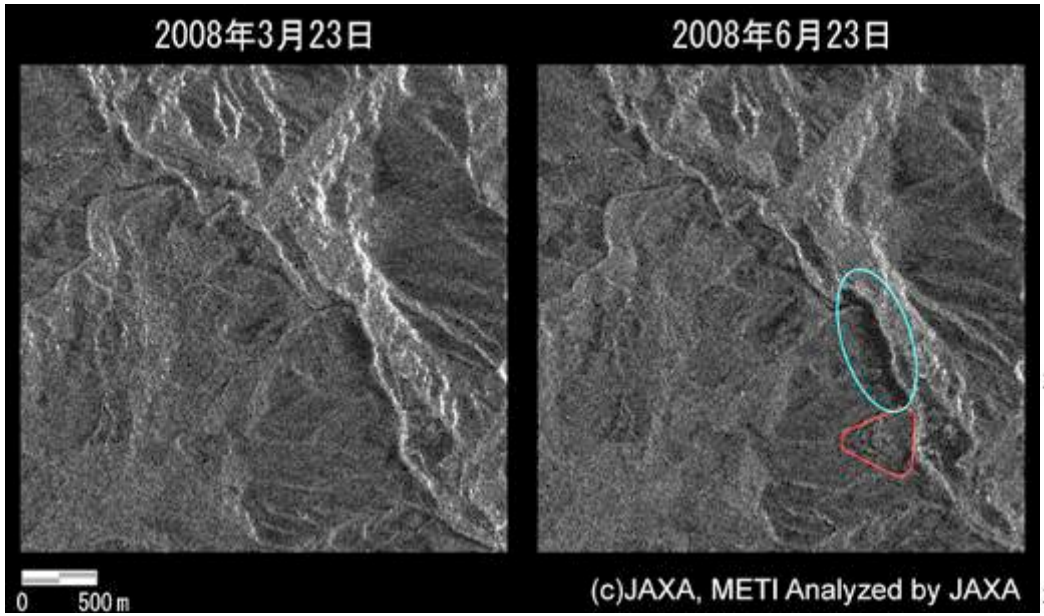
China, Sichuan - Earthquake

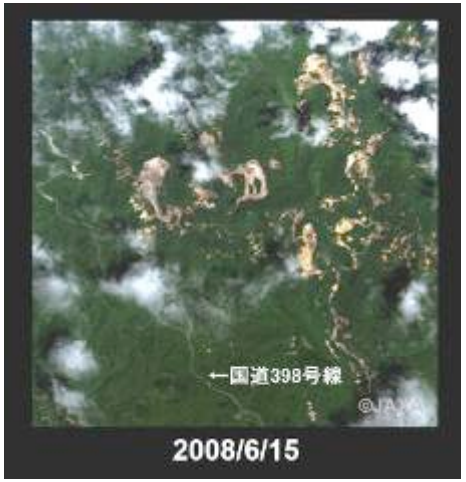


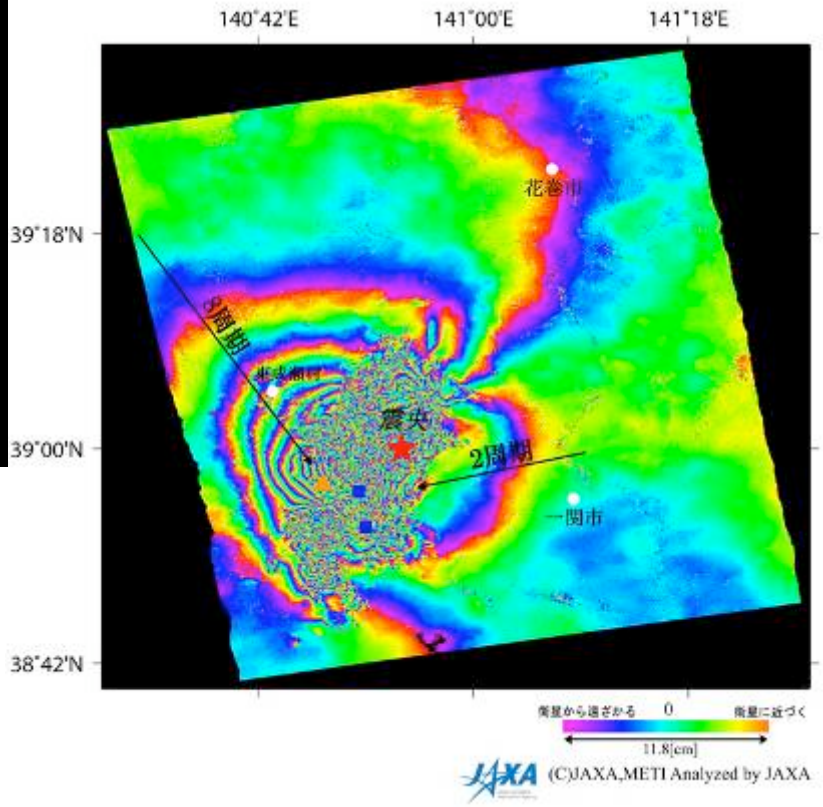




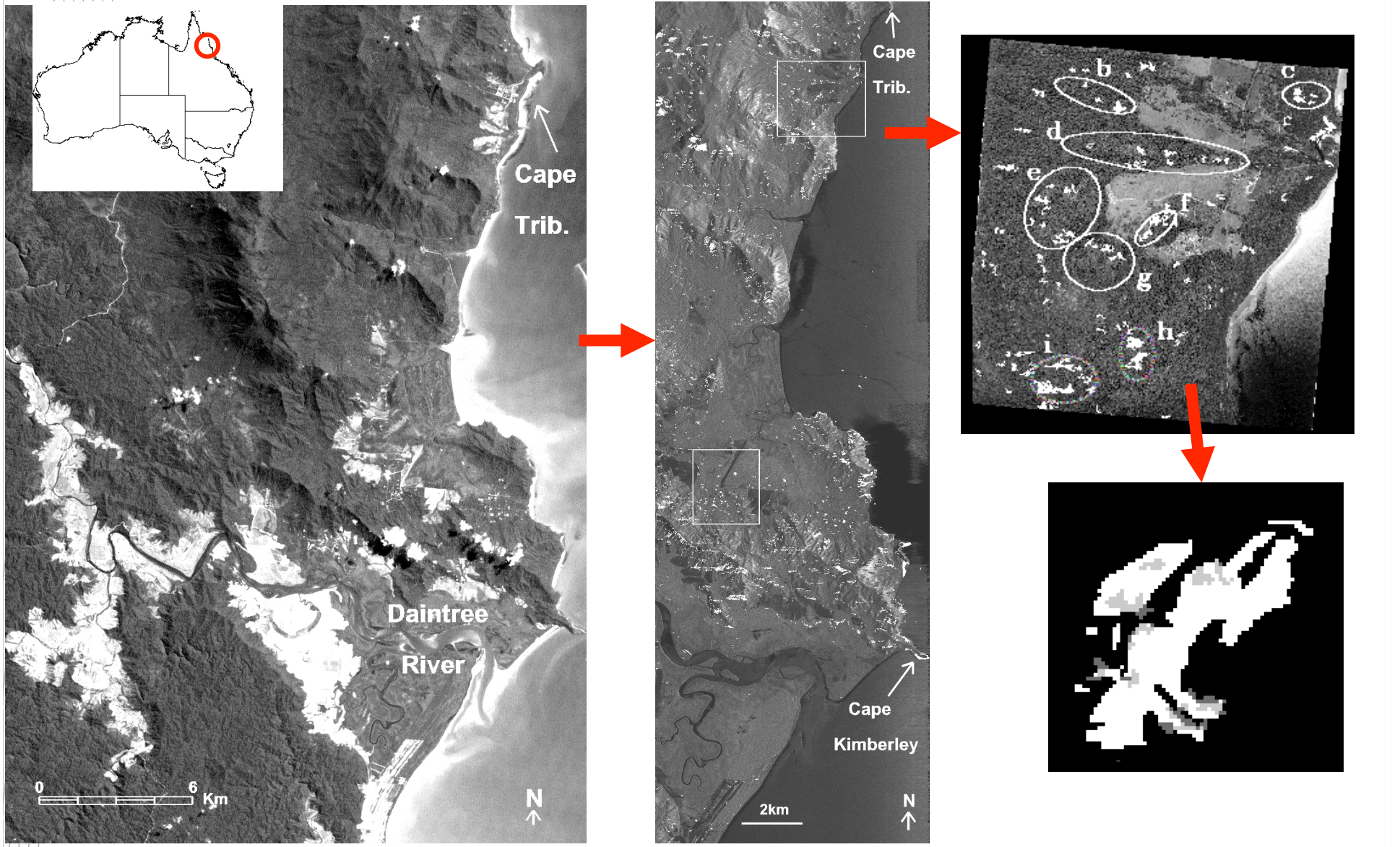
Japan (near Sendai) – Earthquake June 2008







Remote Sensing can also detect change in Forest Cover due to Cyclone Damage

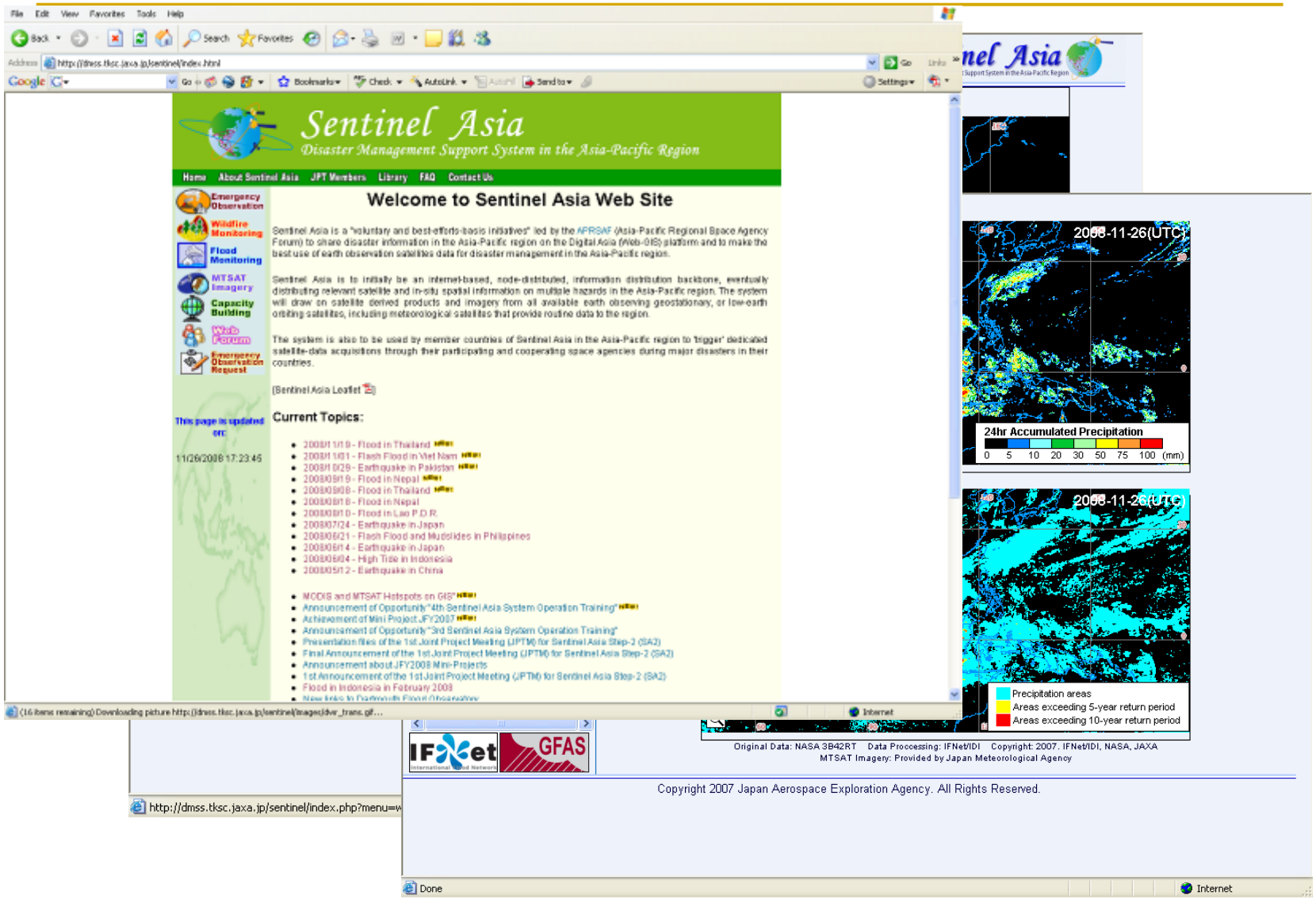


Forest clearing, steep terrain and high rainfall may lead to Landslides

Land-clearing event in tropical Queensland detected by Landsat and JERS-1

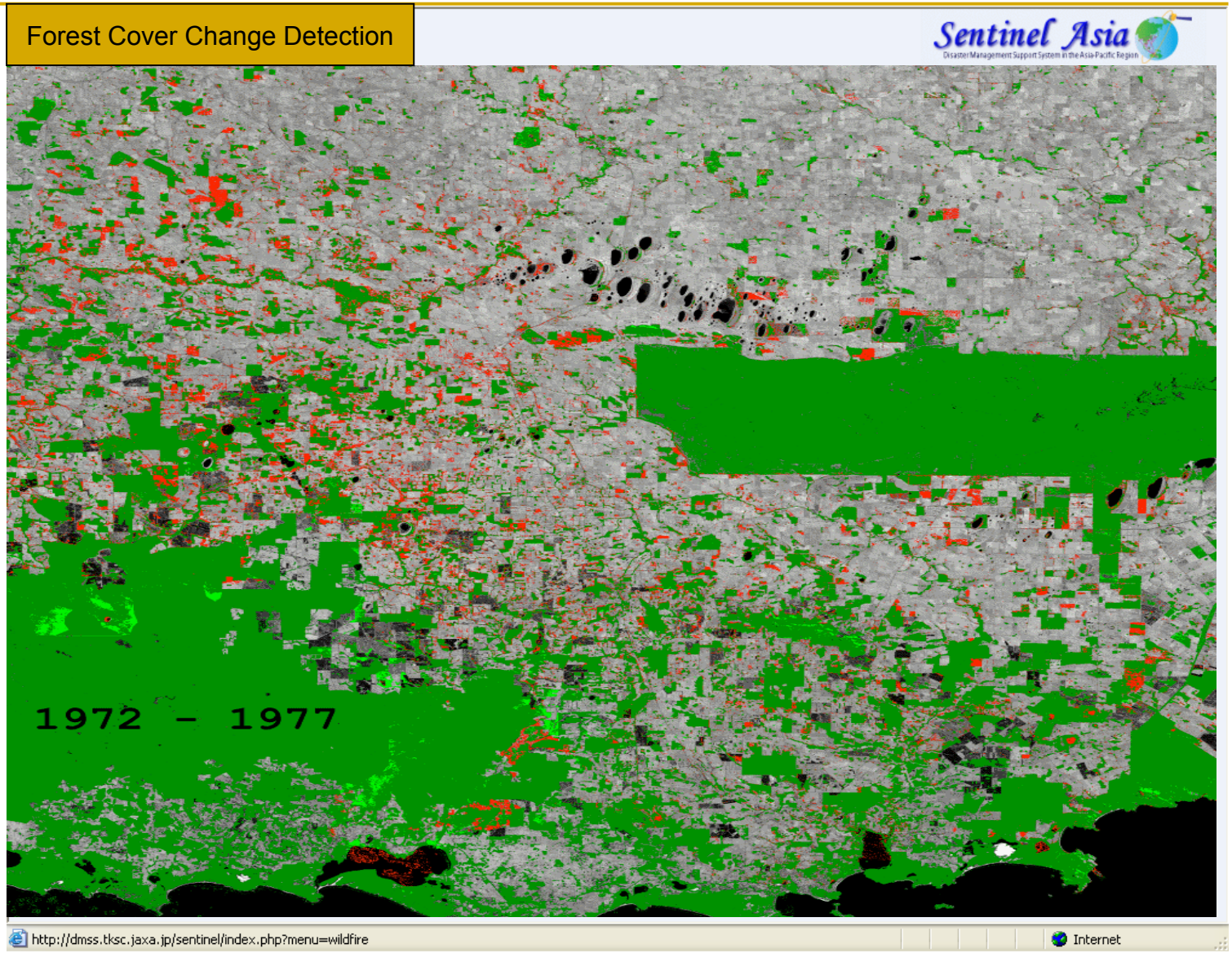
Photos of Landslides in Philippines and Canada

Current Sentinel Website

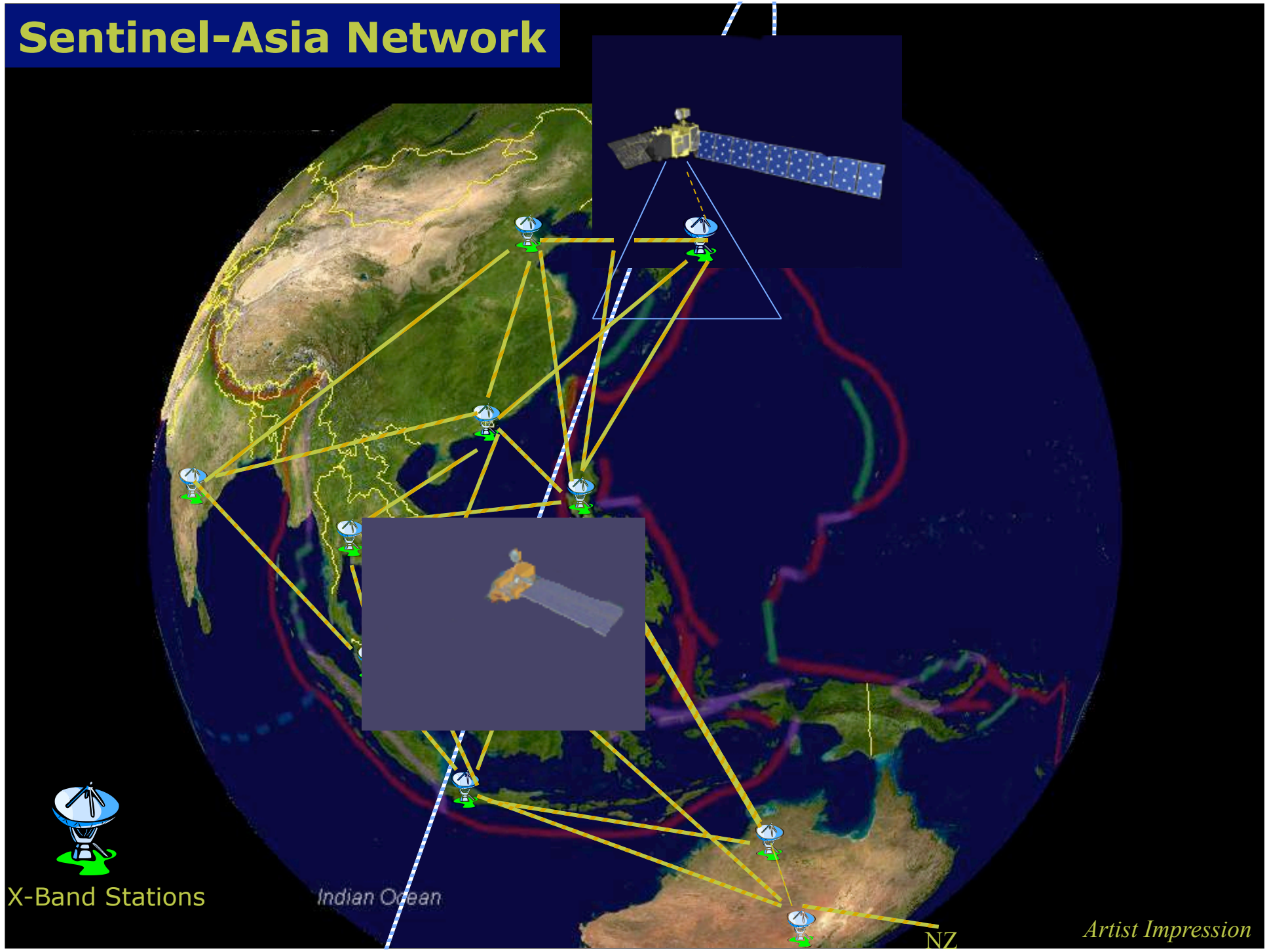


New Page on Forest Cover Change Information ?

Forest Cover Change Detection



Sentinel-Asia Network



Synergies between GEO Forest & Carbon Task, Ecosystem Monitoring and Disaster Monitoring

- **Forest Cover information can be used as an indicator of potential risk of future disasters (eg Landslides) or loss in ecosystem services (eg clean water, biodiveristy, etc.)**
- **A joint system encourages a common monitoring frameworks and data-sharing, consistent with GEOSS interoperability principles**
- **Uses of many common earth observation datasets (eg satellite data, in-situ forest assessments)**
- **Use common regional information delivery concepts and backbones**

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Thank you

Please visit Sentinel Asia at http://dmss.tksc.jaxa.jp/sentinel/

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