

# The Phased Array type L-band Synthetic Aperture Radar (PALSAR)

## Outline of PALSAR

Phased Array type L-band Synthetic Aperture Radar (PALSAR) is developed by Japan Space Systems (J-spacesystems) and Japan Aerospace Exploration Agency (JAXA), aimed for contributing on resource exploration, regional observation, map production and disaster monitoring. PALSAR is the improved synthetic aperture radar of the former Japanese Earth Resource Satellite-1 (JERS-1) [Fuyo], launched on February 11, 1992.

PALSAR is onboard on the Advanced Land Observing Satellite (ALOS) [Daichi] and launched by the H-IIA launch vehicle No.8 at 10:33 January 24, 2006 (JST). The operation was completed due to power generation anomaly of the satellite on April 22, 2011, after exceeding the five-year target life on January 24, 2011.

## Features of PALSAR

### ●L-band (1,270 MHz)

Ground surface is possibly observed, penetrating forests and vegetation.

### ●High resolution

10 meter-resolution is achieved in the High Resolution Observation Mode.

### ●Variable Off-Nadir Angle (Observation Angle)

Ground targets are observed from various viewing angle using active phased array technology.

### ●Wide viewing observation

ScanSAR mode provides the wide-viewing observation ranging from 250 to 350 km in swath.

### ●Full polarimetric observation

Two polarization observations, H-H and V-V are available.

Horizontal and vertical components are simultaneously received for each transmission.

Full function for observing four polarimetric features of target is equipped.

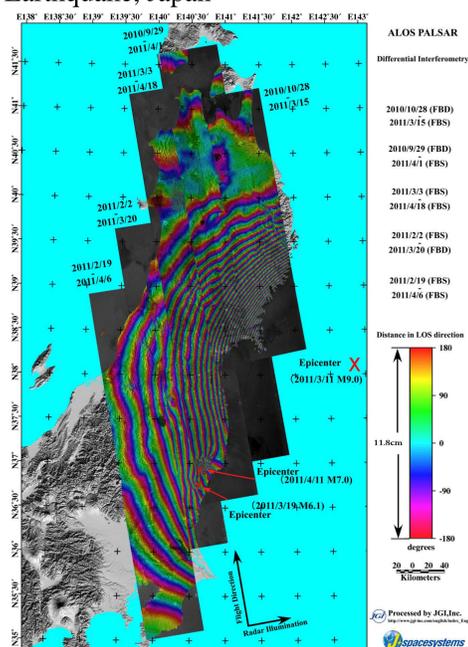
## Major characteristics

| Observation mode            |         | Fine resolution mode        | ScanSAR mode | Polarimetric mode    |
|-----------------------------|---------|-----------------------------|--------------|----------------------|
| Center frequency            |         | 1.270GHz (L-band)           |              |                      |
| Chirp bandwidth             |         | 28MHz                       | 14MHz        | 14MHz                |
| Polarization                |         | HH or VV or HH+HV or VV+VH  | HH or VV     | HH+HV+VV+VH          |
| Ground resolution           | Range   | 10m*                        | 20m*         | 100m*                |
|                             | Azimuth | 10m (2looks)                | 10m (2looks) | 100m                 |
| Observation swath           |         | 70km                        | 70km         | 250-350km (3-5scans) |
| Off-nadir angle             |         | 10~51degrees                |              | 10~26degrees         |
| Signal/Ambiguity            | Range   | 16dB                        |              | 21dB                 |
|                             | Azimuth | 21dB                        |              | 19dB                 |
| Transmitting peak power     |         | more than 2kw               |              |                      |
| Noise equivalent sigma zero |         | -25~-23dB                   |              | -25dB                |
| Antenna size                |         | 8.9m x 3.1m                 |              |                      |
| Mass                        |         | 638.3kg (All PALSAR system) |              |                      |
| Power consumption           |         | 1,115W (Observation mode)   |              |                      |

Note: '\*' shows the values defined at typical off-nadir angle.

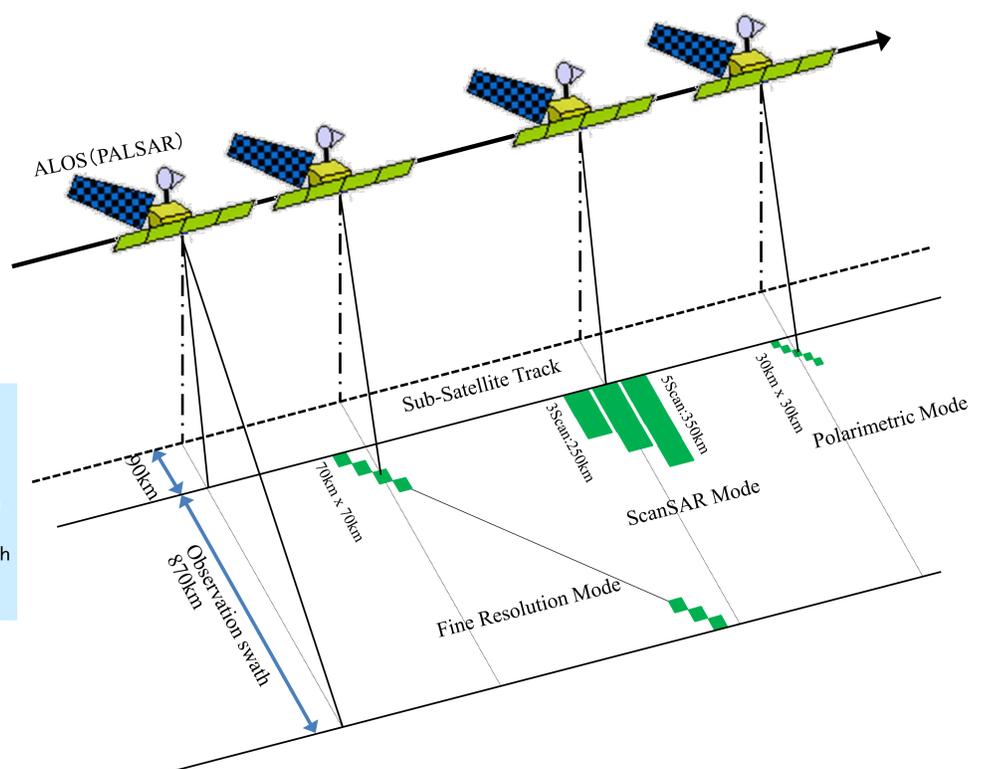
## Observed results

PALSAR DInSAR results of the 2011 off the Pacific coast of Tohoku Earthquake, Japan



Surface deformation along the direction between the satellite and ground target is shown in color cycle.  
 Northern part (Bluish green→Yellow→Red→Blue, 11.8cm approaching) : Ground uplift  
 Southern part (Blue→Red→Yellow→Bluish green, 11.8cm going away) : Ground subsidence

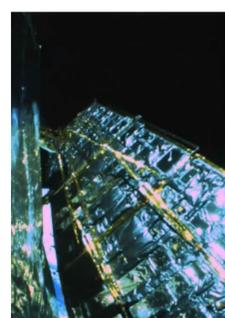
## Observation modes



Oil slick accident from Seafloor Oil field in Mexico Bay



• Observation date: May 23, 2010  
 • Observation mode: Scan SAR  
 • Blackish region at the center of image seems to be corresponding to slicked oil.



Antenna deployment



ALOS satellite



H-IIA launch vehicle No. 8 on January 24, 2006  
 (Photographs: provided by JAXA)