Earth Observation Forum Tuesday 28th August 2012
'Working together to achieve the best use of Earth Observation data'
To celebrate the 50th Anniversary of ISRSE

JAXA's Earth Observation Programme

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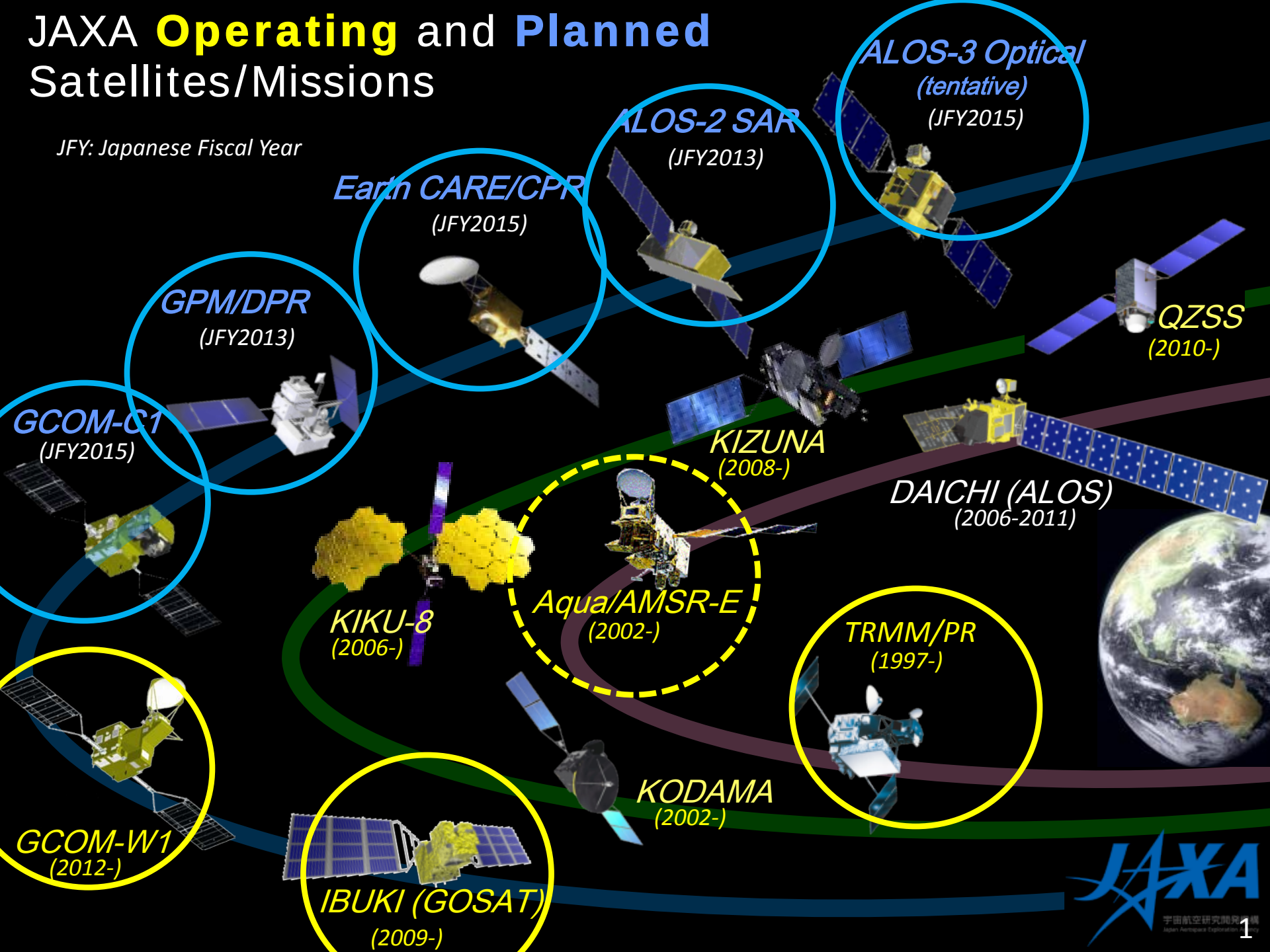
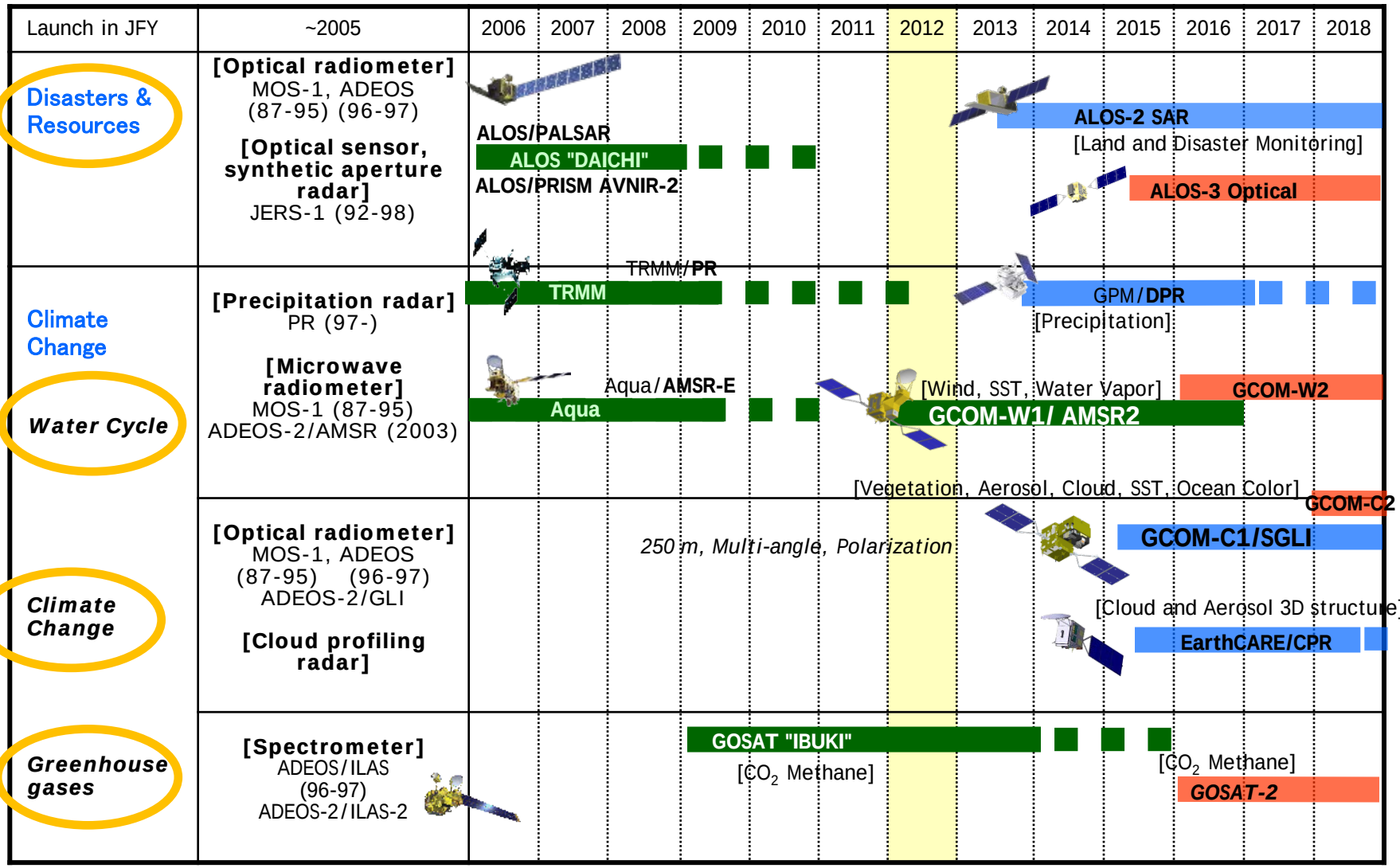
Earth Observation Research Center
Japan Aerospace Exploration Agency

JAXA **Operating** and **Planned** Satellites/Missions

JFY: Japanese Fiscal Year



Long-Term Plan for JAXA's Earth Observation Program



ALOS to ALOS-2 and ALOS-3

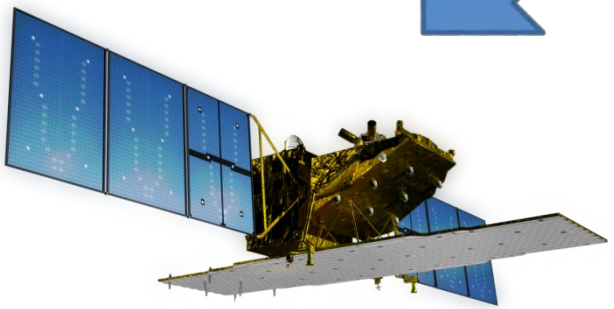
ALOS Jan. 2006-May 2011

Weight : 4 t

PALSAR

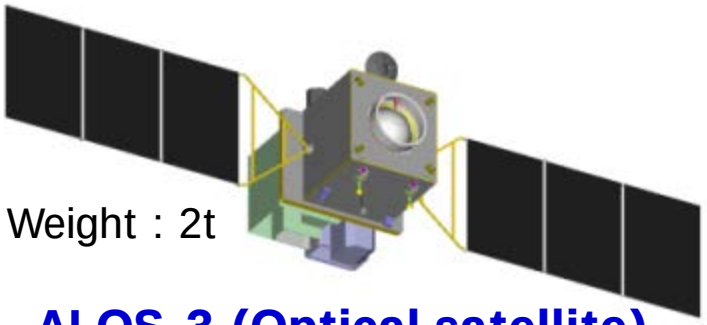
PRISM

AVNIR-2



Weight : 2t

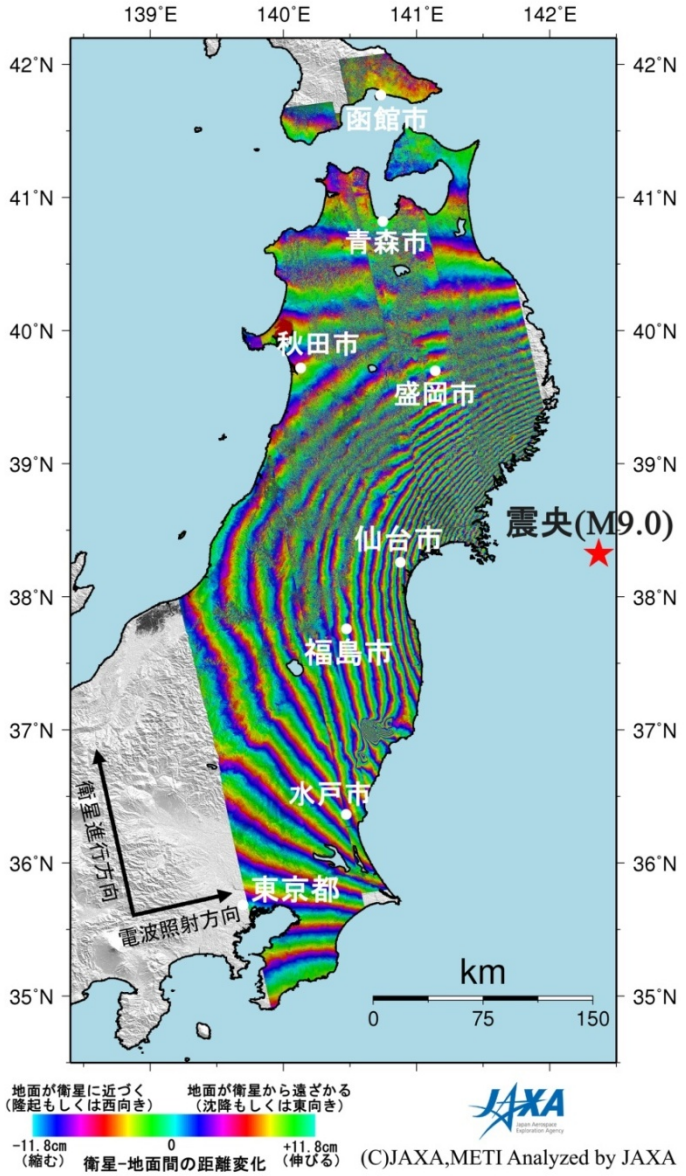
ALOS-2 (SAR satellite)
Launch: JFY2013

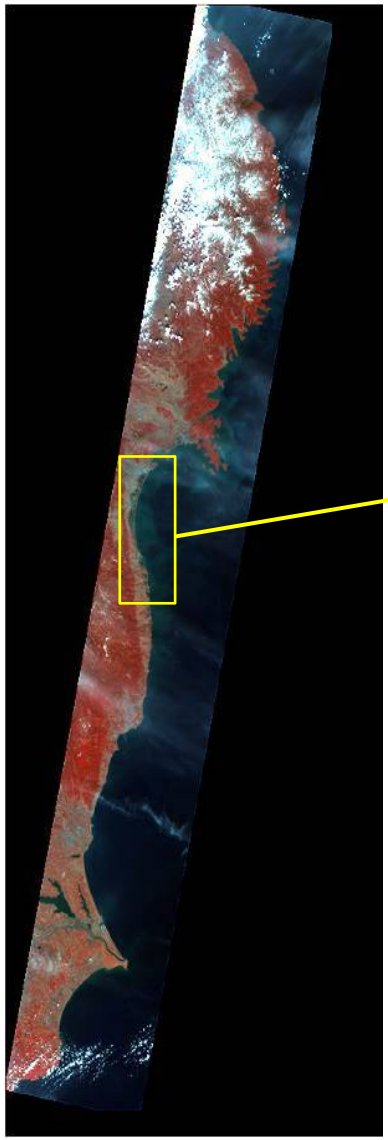


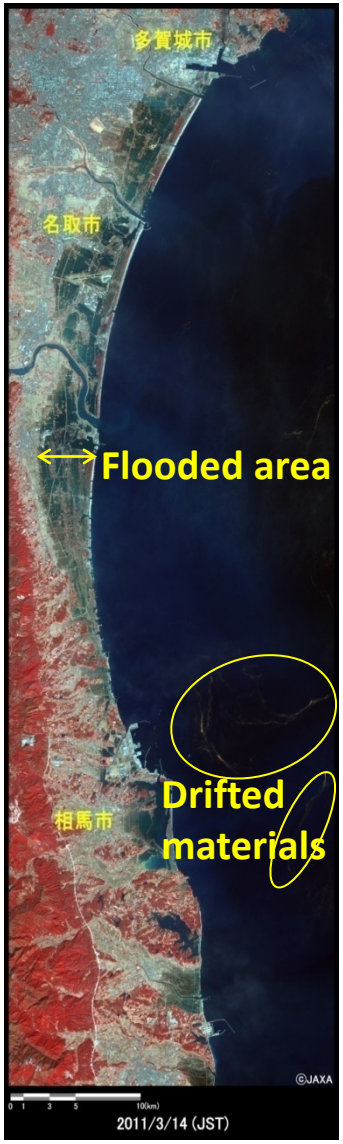
Weight : 2t

ALOS-3 (Optical satellite)
Launch: JFY2015

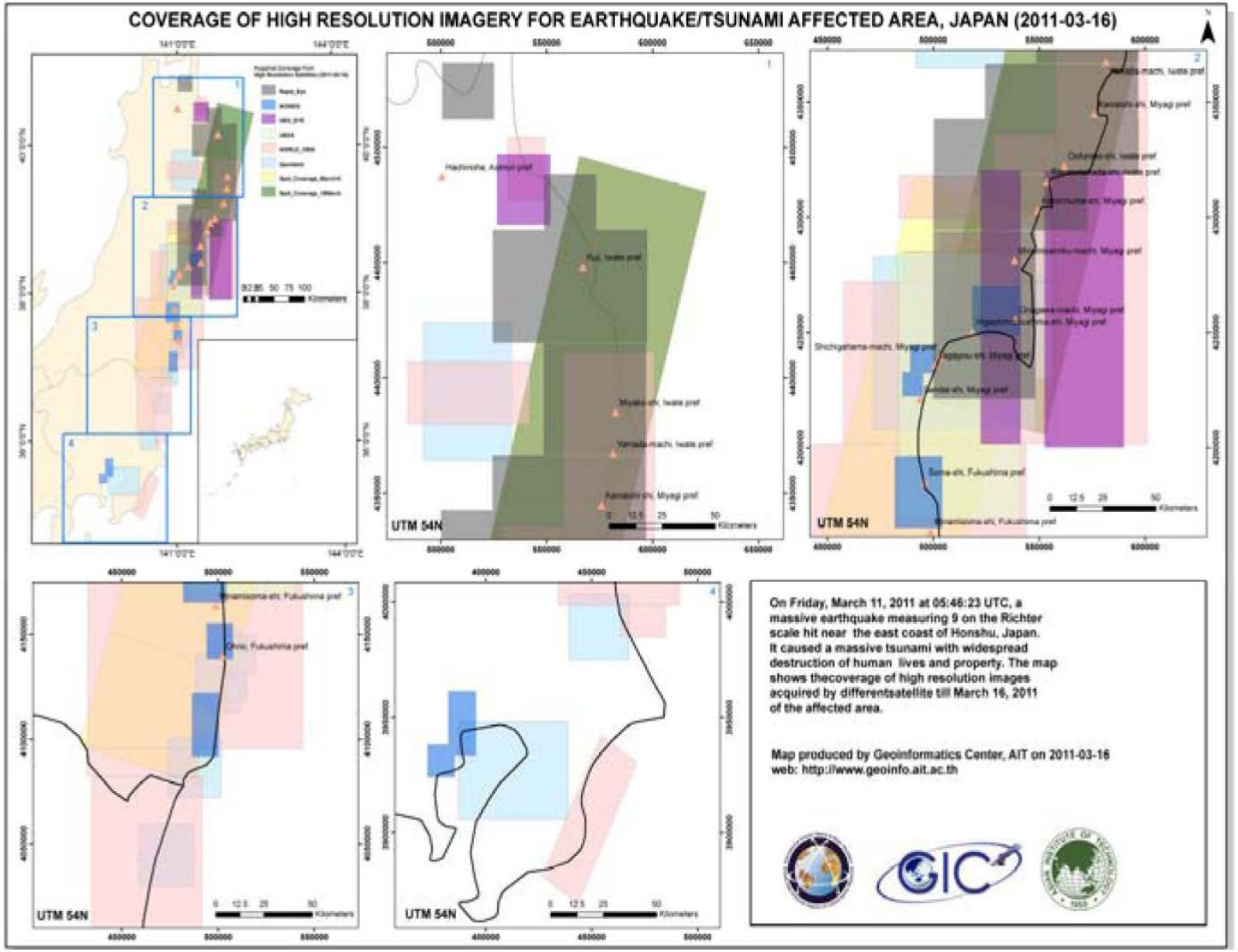
ALOS Emergency Observation after the Great East Japan Earthquake



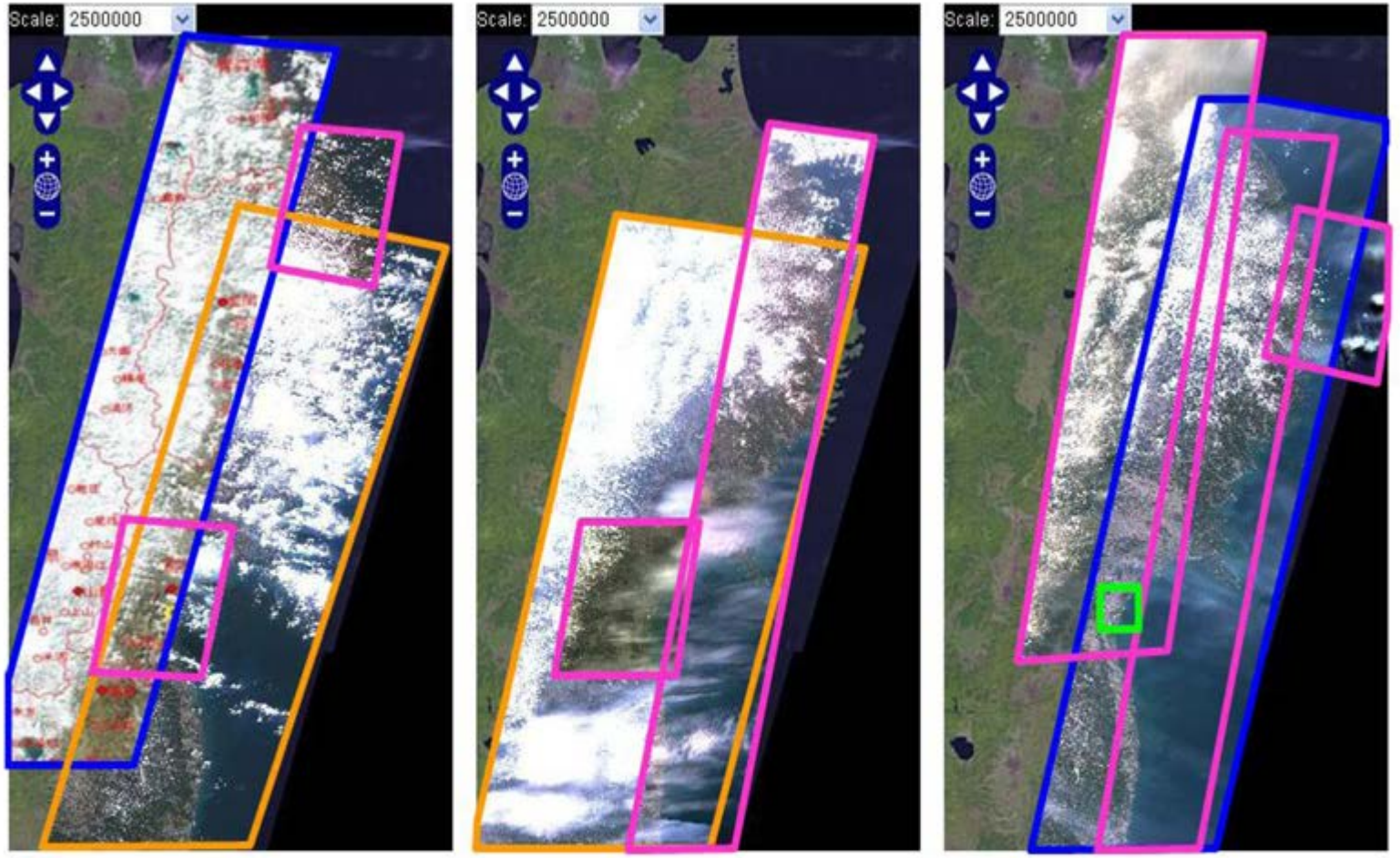




Emergency Observation by International Charter



Emergency Observation by Sentinel Asia



Emergency Observation Summary

ALOS "Daichi"

- **Duration: March 12 – April 21**
  PRISM: 3, AVNIR-2: 34, PALSAR: 26 paths
- **about 400 scenes in total**

International Charter/Sentinel Asia

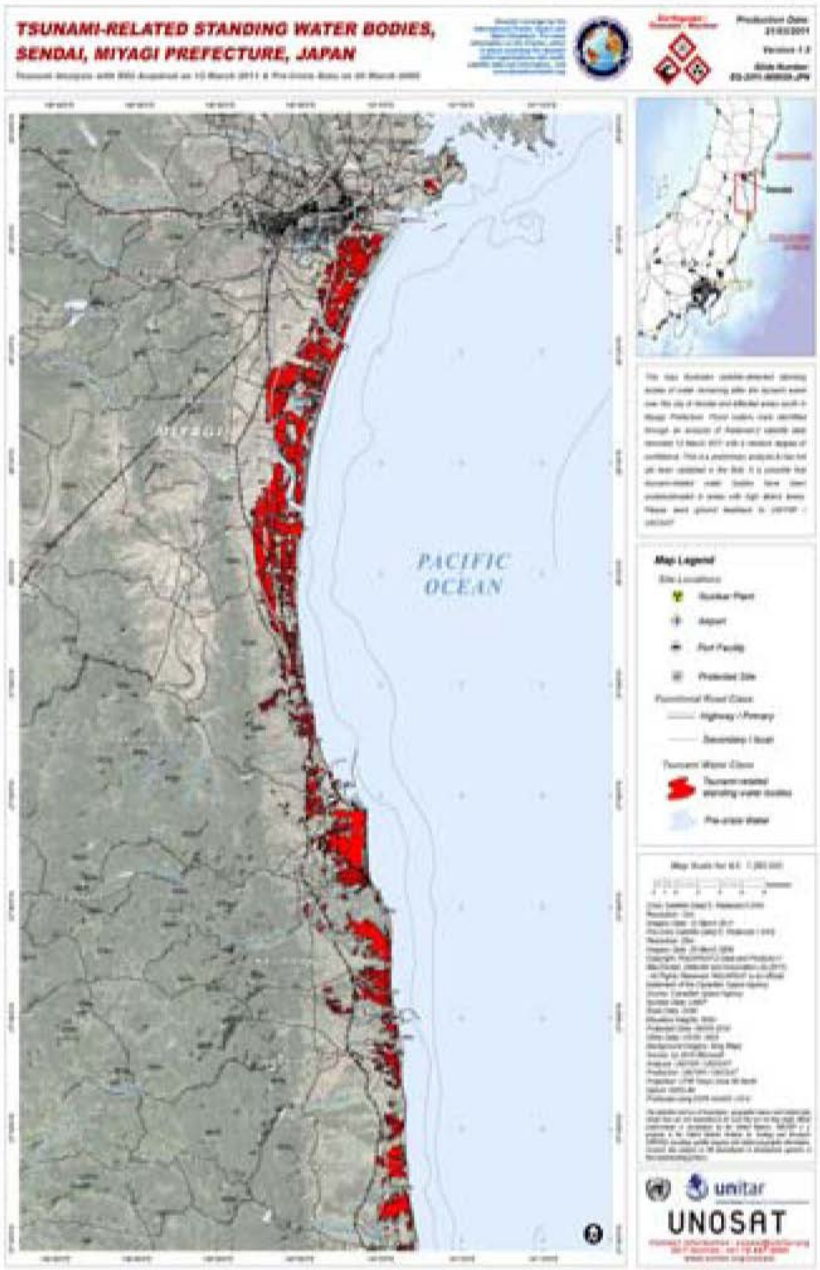
Emergency Obs.: 4,508 scenes
Reference: 835 scenes

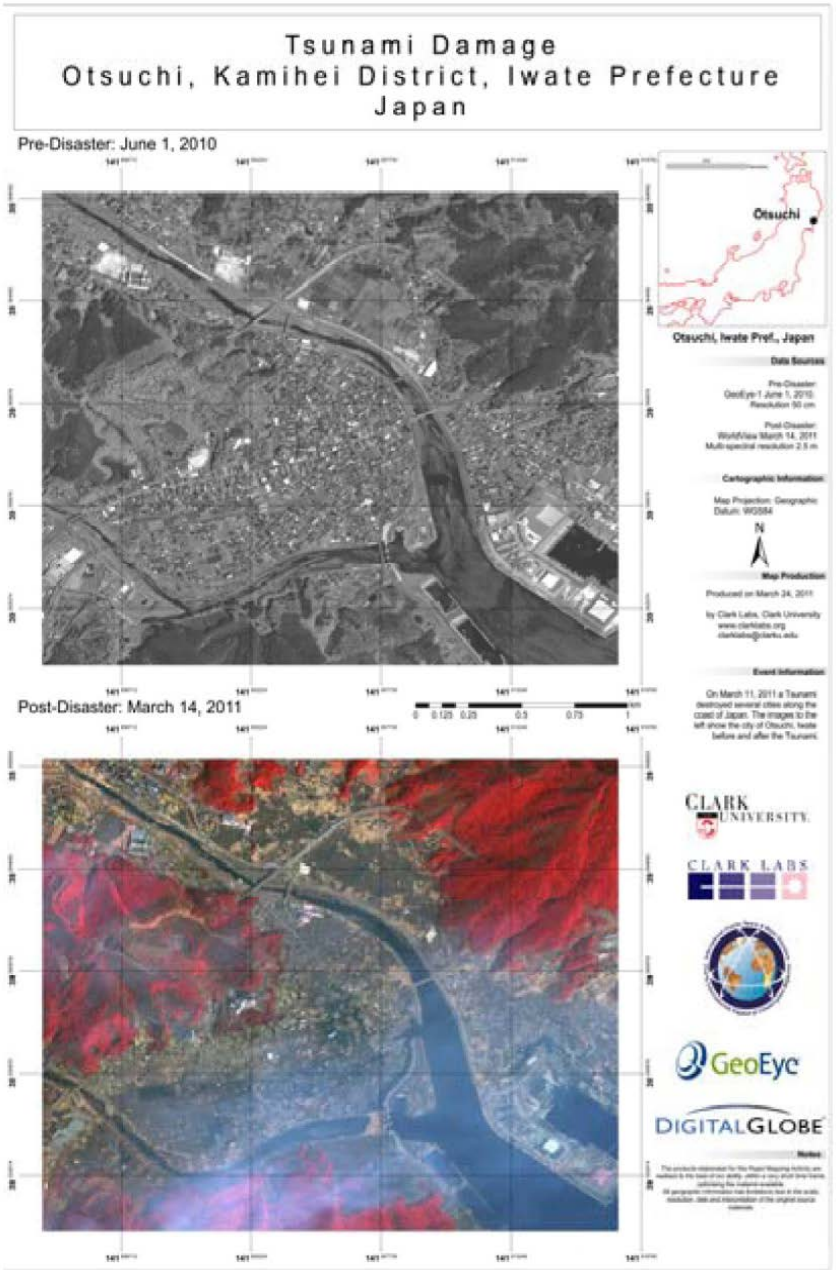
SAR Satellite	Agency
TerraSAR-X	DLR
RADARSAT-1,2	CSA
ENVISAT	ESA
COSMO-SkyMed	ASI

Optical Satellite	Agency
IKONOS-2	USGS
GeoEye-1	USGS
QuickBird-2	USGS
WorldView-1,2	USGS
SPOT-5	CNES
Kompsat-2	KARI
RapidEye	DLR
HJ	CNSA
Landsat-5,7	USGS
EO-1	USGS
Formosat-2	NSPO
THEOS	GISTDA
RESURS-DK	ROSCOSMOS
DEIMOS-1	DEIMOS
DubaiSat-1	EIAST

International Charter **Sentinel Asia** **Others**

Data Analysis by International Partners





ADEOS-II to GCOM-W and C

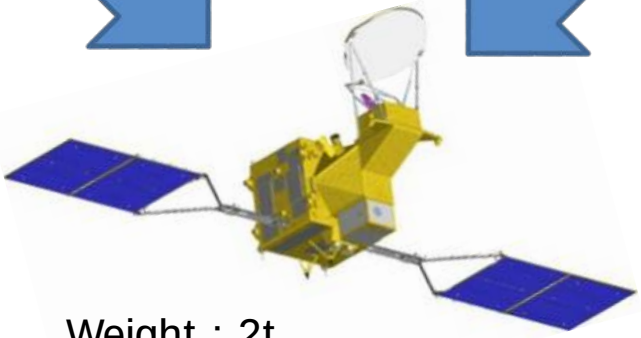
ADEOS-II Dec. 2002- Oct. 2003

Weight : 3.7 t

AMSR GLI

Aqua / AMSR-E

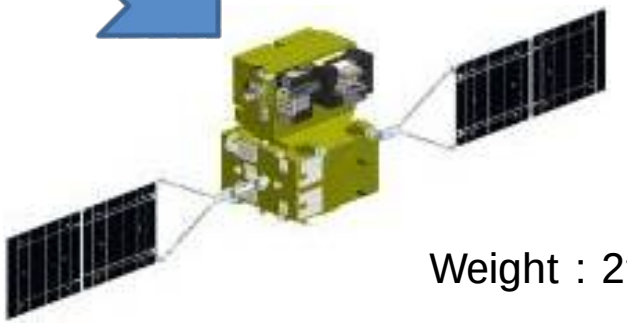
May 2002-



Weight : 2t

GCOM-W1 (AMSR2)

May 18, 2013 -



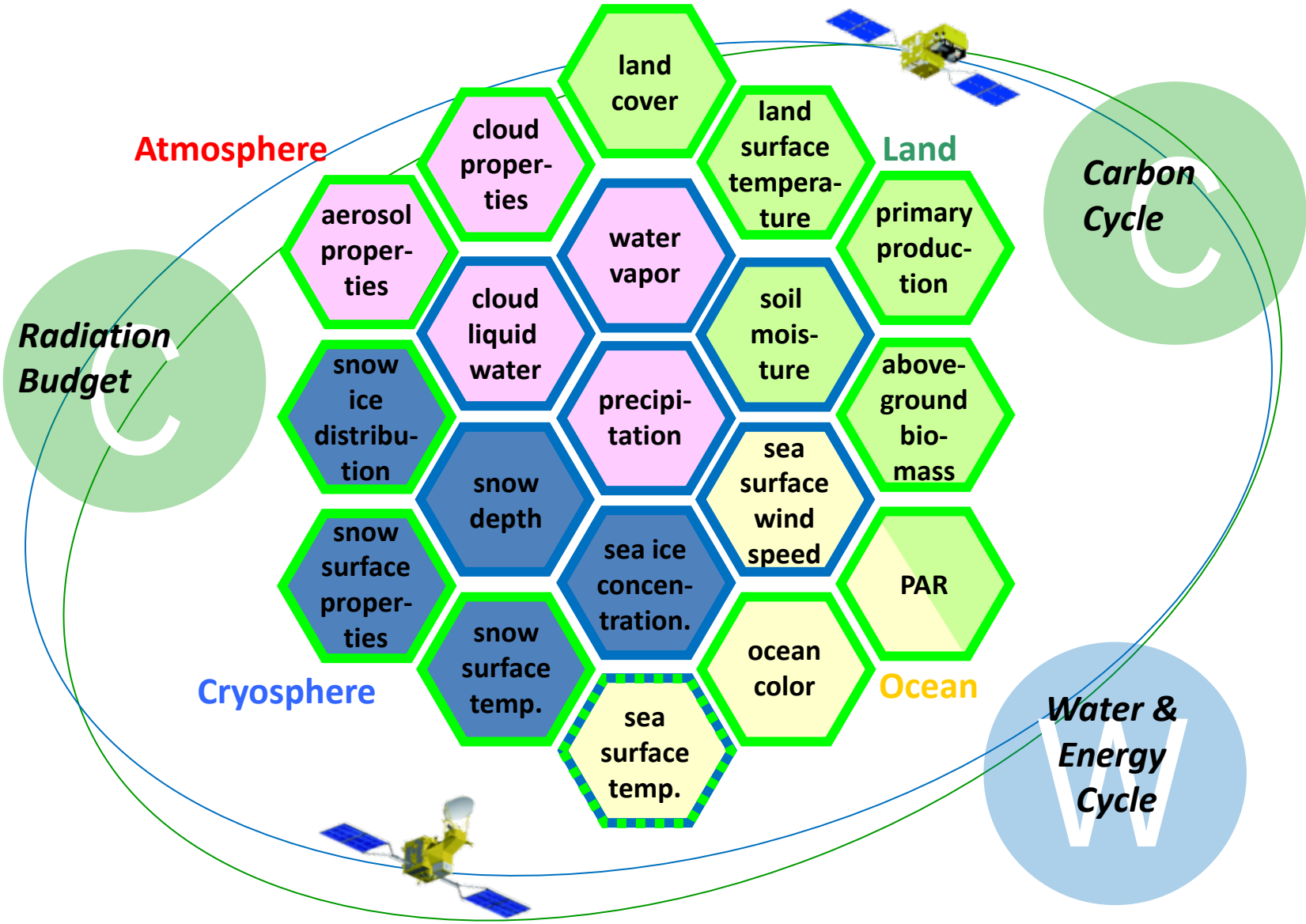
Weight : 2t

GCOM-C1 (SGLI)

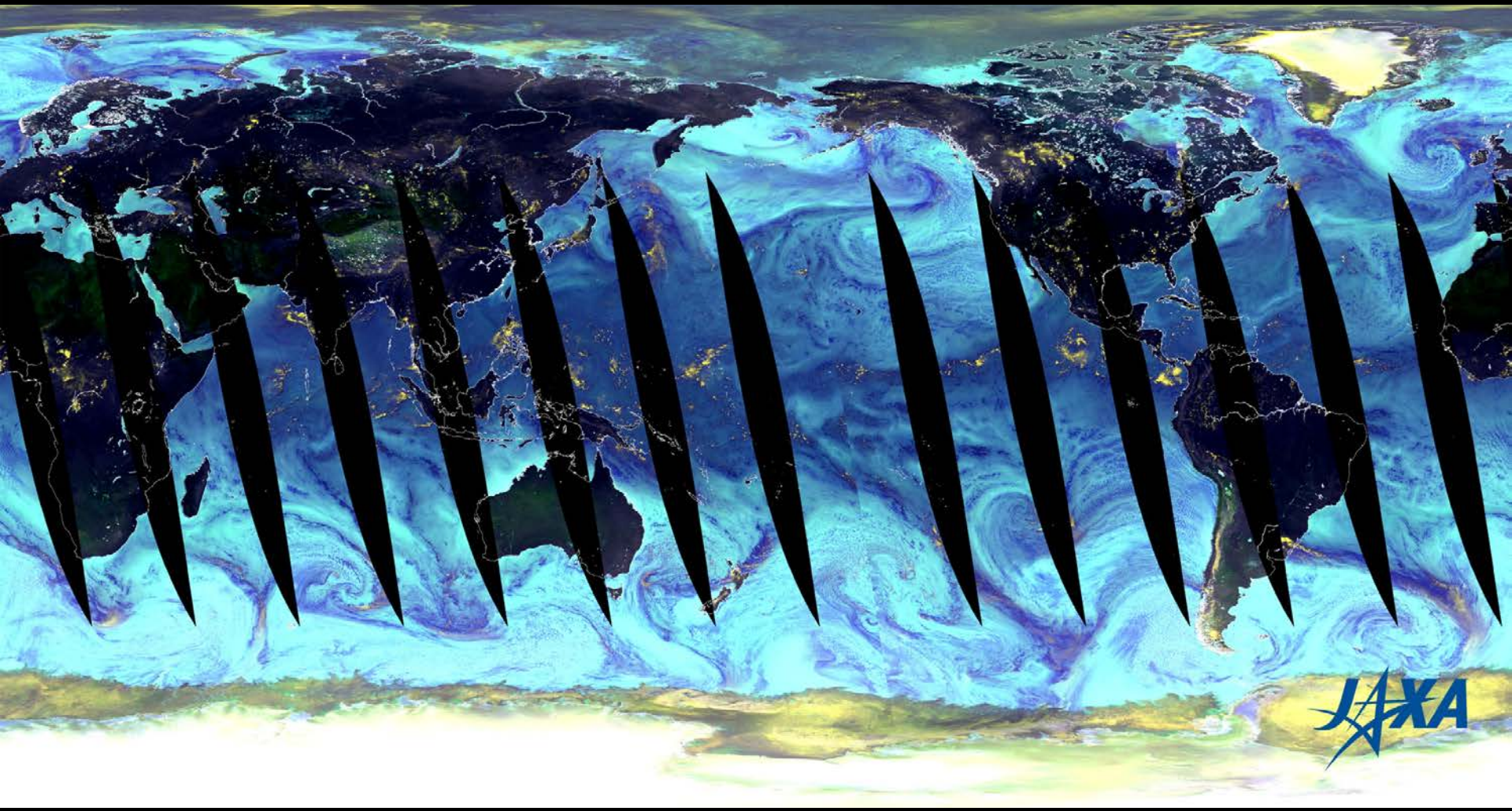
Launch: JFY2015

GCOM consists of 2 satellite series (GCOM-W and GCOM-C), and 3 satellite generations that will be used to perform consistent and sustained global observations for 10-15 years

Target Geophysical Parameters of GCOM

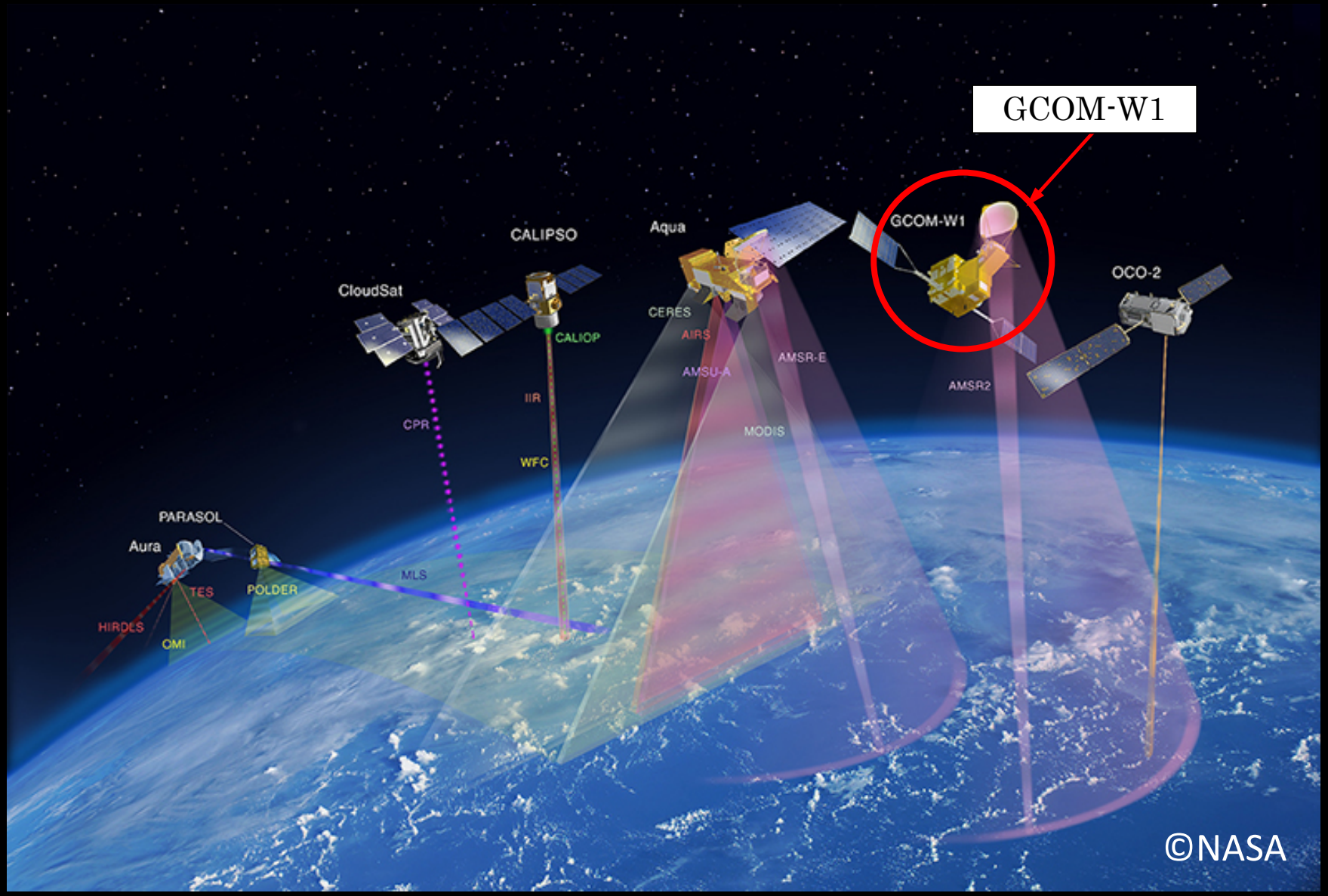


GCOM-W1 “Shizuku” First Light Image

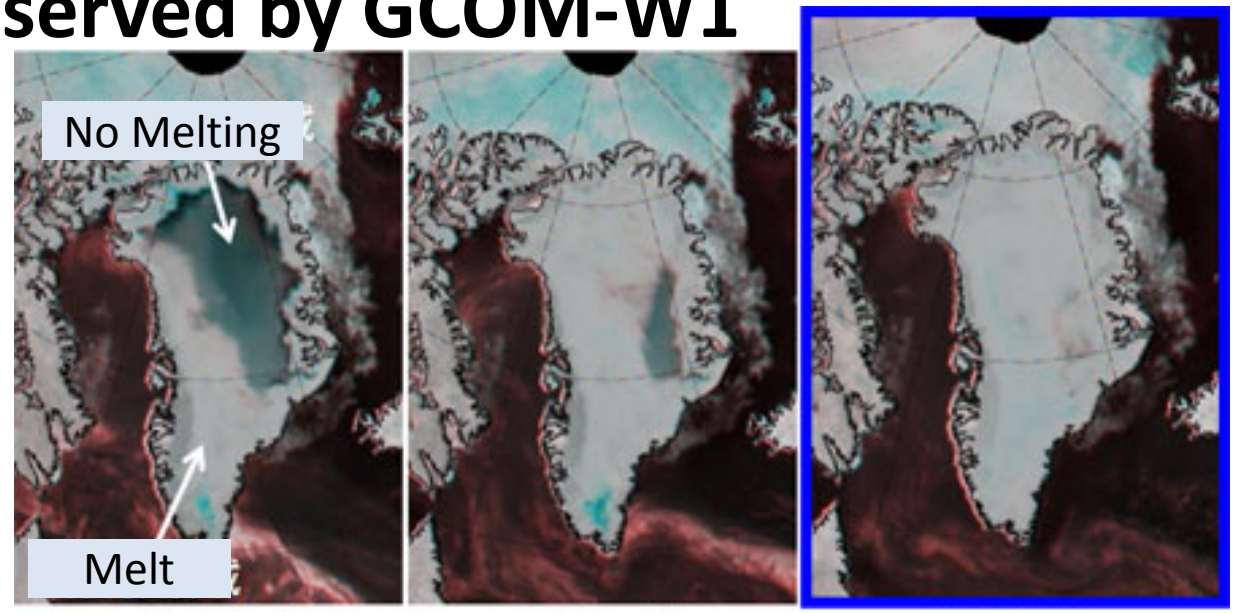


AMSR-2 color composite image (July 3, 2012)

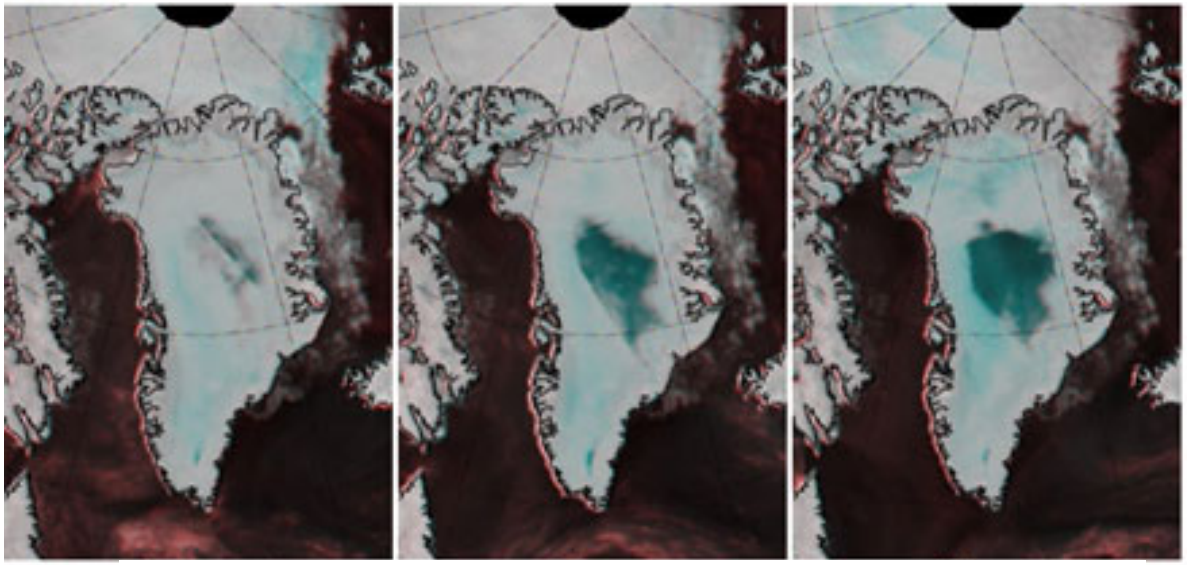
GCOM-W1 in the Afternoon Constellation (A-Train)



Greenland Ice Sheet Surface Melt in July 2012 observed by GCOM-W1

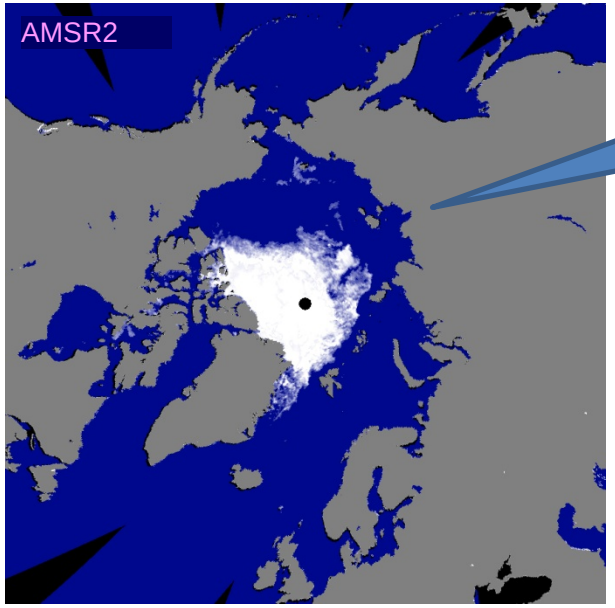


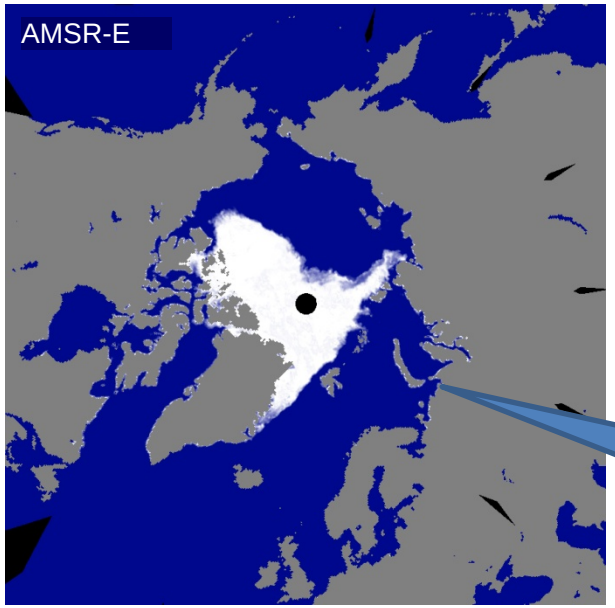
July 10 July 11 July 12



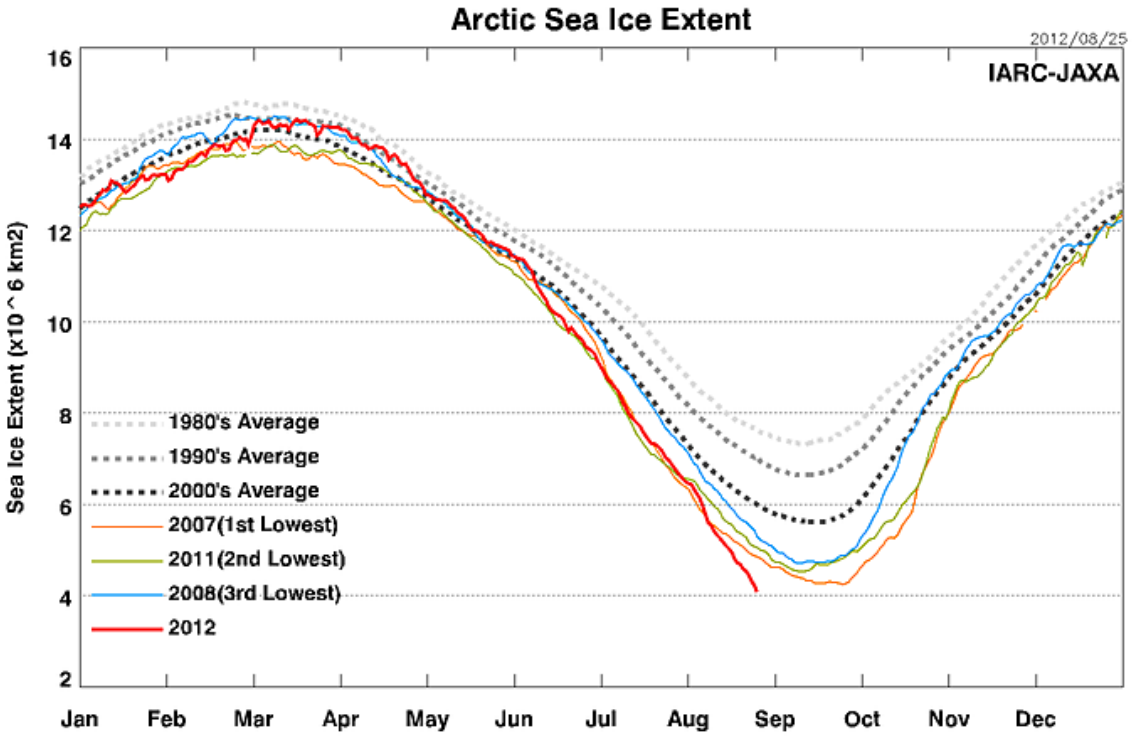
July 13 July 14 July 15

Long-term Arctic Sea-Ice Monitor Using PMRs





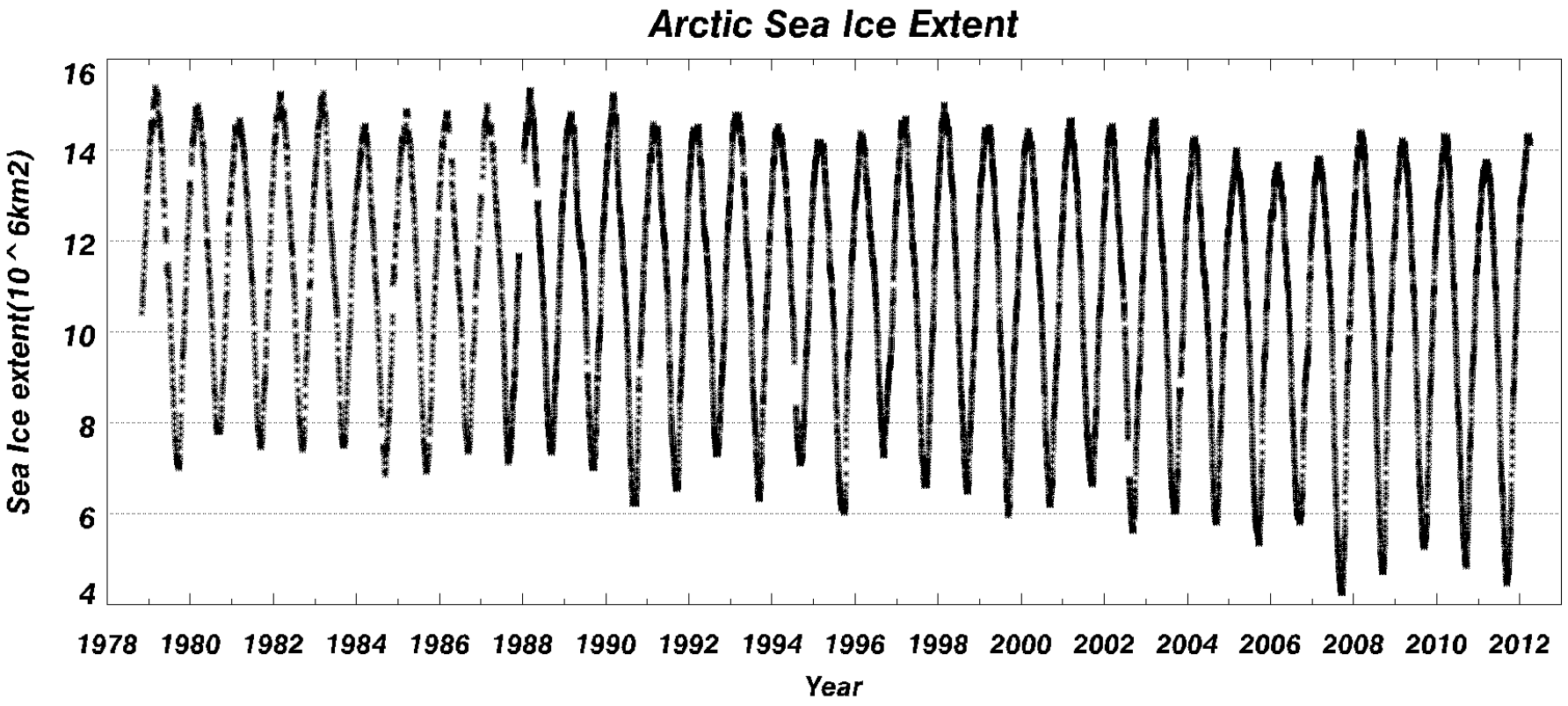
Current sea-Ice extent (4.21×10^6 km^2) on Aug 24, 2007



http://www.ijis.iarc.uaf.edu/en/home/seaice_extent.htm

The 'old' smallest sea-Ice extent record (4.25×10^6 km^2) on Sep. 24, 2007

Arctic Sea Ice Extent: 1978–2012



PMR data used in sea ice dataset

Satellite and Sensor	Nimbus/ SMMR	DMSP/ SSM/I	Aqua/ AMSR-E	Coriolis/ WINDSAT	GCOM-W1/ AMSR2
Used Data Period	1978.11-1987.7	1987.7-2002.6	2002.6-2011.10	2011.10-2012.x	2012.7 (plan)-
Observing Frequency	2days	Daily	Daily	Daily	Daily
Frequency Band [GHz] (Unused for sea ice)	18V,37VH (6VH,10VH, 18H,21VH)	19V,22V,37VH (19H,85VH)	6V,18V,23V,36VH (6H,10VH,18H, 23H,89VH)	18V,23V,37VH (6VH,10VH,18H, pol. channels)	6V,18V,23V,36VH (6H,7VH,10VH, 18H,23H,89VH)
Incidence Angle [deg]	50.3	53.1	55.0	49.9 – 55.3	55.0
IFOV at 36 GHz [km]	27×18	38×30	14×8	13 × 8	12 × 7
Swath Width [km]	780	1,400	1,450	1,000	1,450 (Effective 1,600)

Global Precipitation Measurement (GPM)

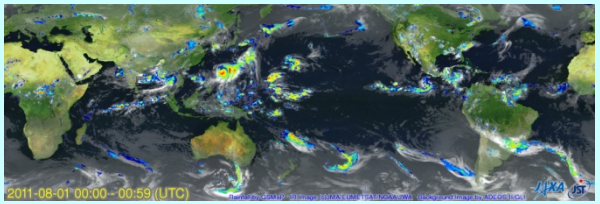
- GPM Core Observatory and the constellation of satellites will facilitate global, frequent, and accurate precipitation observation.
- Dual-frequency Precipitation Radar (DPR) onboard the Core Observatory will be a calibrator for microwave imagers and sounders onboard the constellation of satellites.

Constellation Satellites

Objectives:

- ✓ Observation frequency
- ✓ Science, social applications
- Cooperation with constellation providers: JAXA (GCOM-W), NOAA (JPSS), CNES/ISRO (Megha-Tropiques), etc.
- 3 hourly observation of 80% of the globe.
- Launch around 2012-2015 by each organization
- Mainly sun-synchronous orbit with an altitude of 600-800 km

image by NASA



Core Observatory

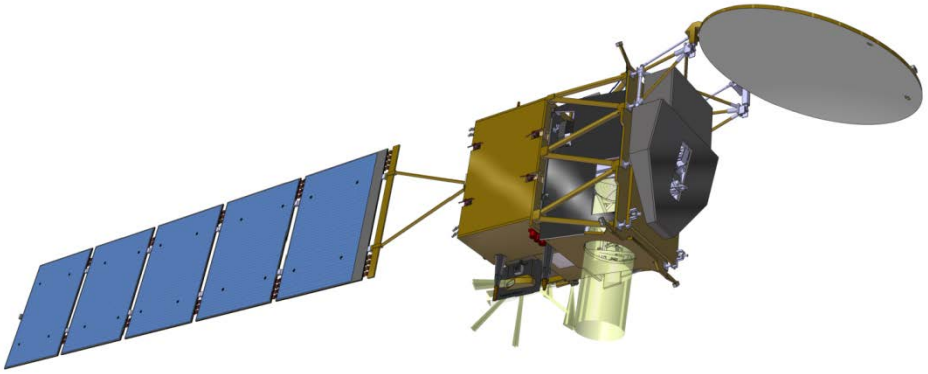
Objective:

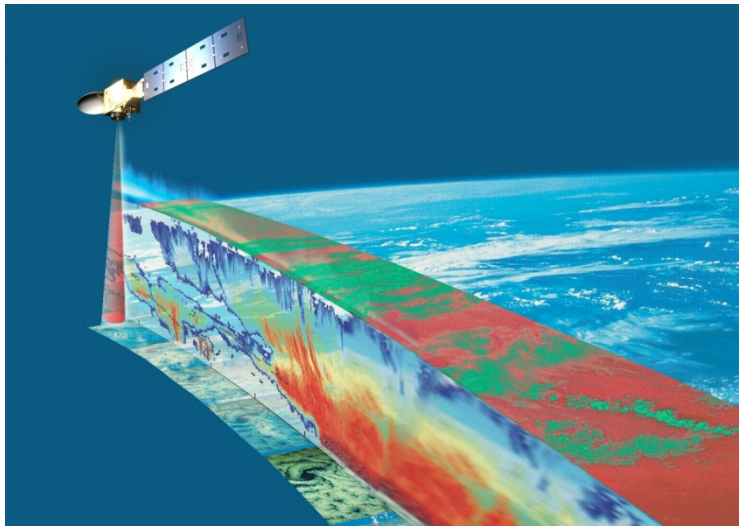
- ✓ Understanding the horizontal and vertical structure of precipitation system
- ✓ Drop size distribution measurement
- ✓ Improvement of precipitation rate accuracy of the constellation satellites
- DPR (JAXA, NICT) (13.6, 35.5 GHz)
- GMI (NASA)
- Launch in JFY2013 by H-IIA rocket
- Non-Sun-synchronous orbit, inclination: 65° , altitude: 407 km

EarthCARE/CPR

Climate monitoring of earth radiation, cloud and aerosol
Cooperation between ESA and Japan (JAXA/NICT)

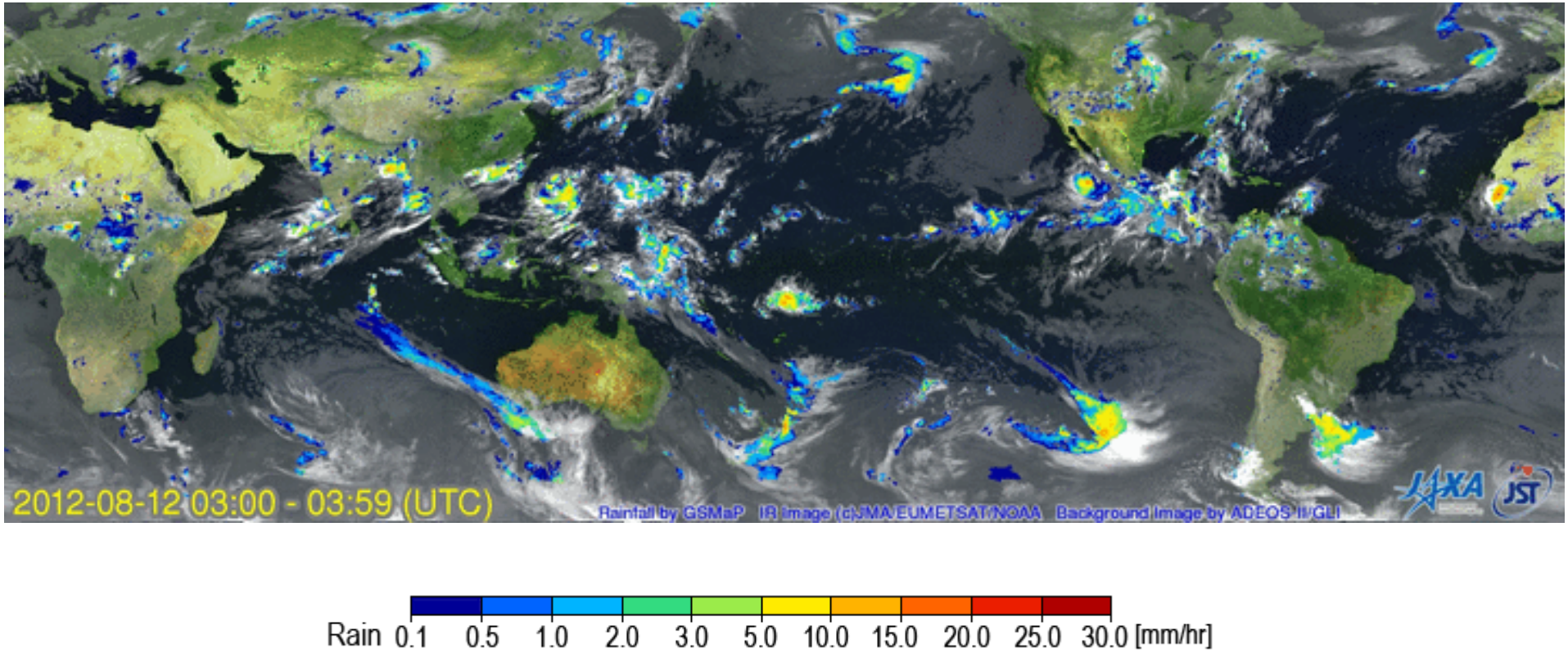
- **Mission**
  - Vertical profile of clouds, aerosol
  - Interaction between clouds and aerosol
  - Cloud stability and precipitation
- **Orbit**
  - Sun synchronous
  - Equator crossing time　13:45
  - Altitude　400km
- **Instrument**
  - CPR (Cloud Profile Radar)
  - ATLID (Atmospheric LIDAR)
  - MSI (Multi-Spectral Imager)
  - BBR (Broad Band Radiometer)
- **Task sharing**
  - JAXA/NICT（CPR）
  - ESA（LIDAR, MSI, BBR, Spacecraft)
- **Launch target**
  - JFY2015





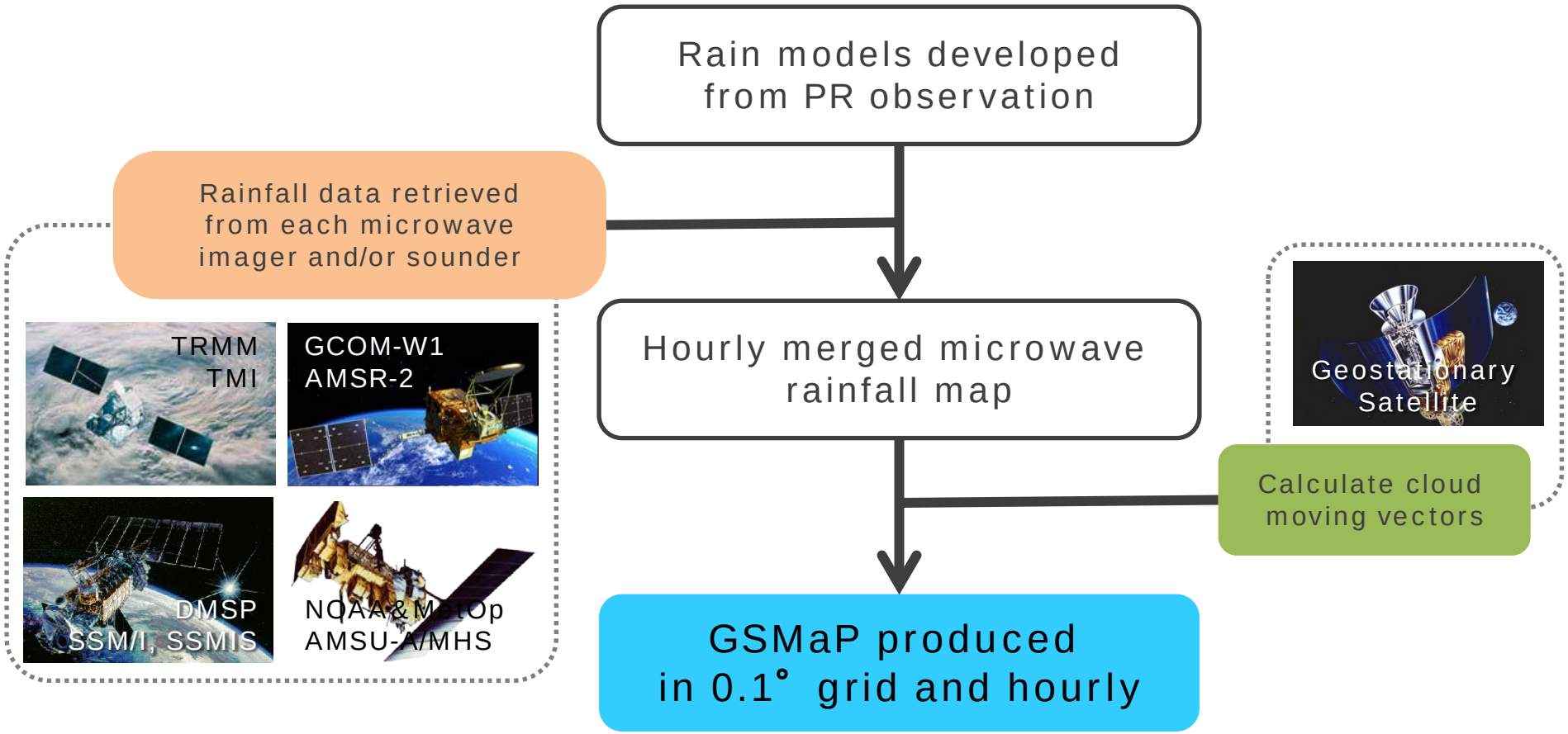
Global Rainfall Map in Near Real Time

0.1° and hourly global rainfall data
available 4 h after observation via Internet
http://sharaku.eorc.jaxa.jp/GSMaP/

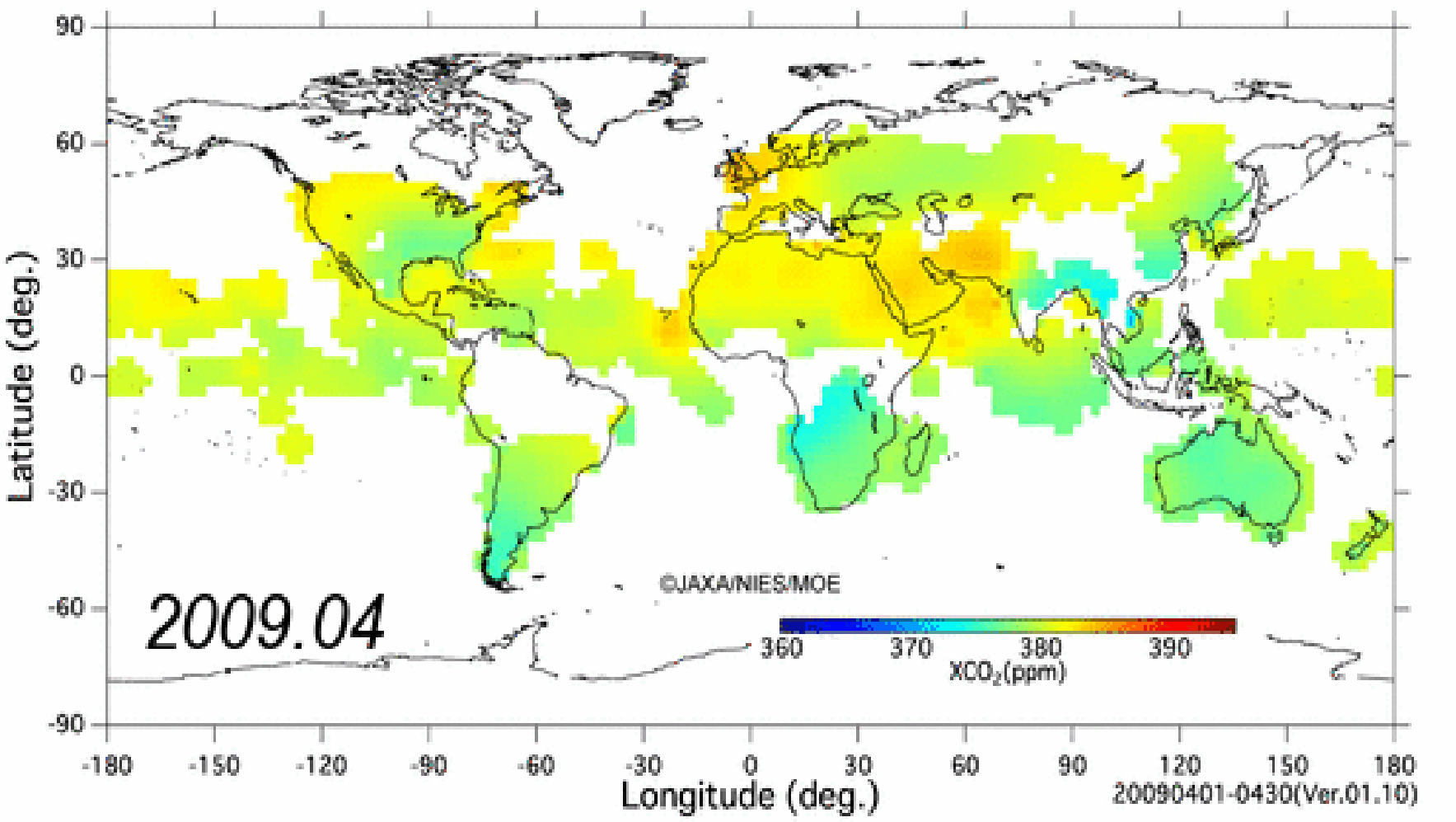


Production of “GSMaP” from Multi-satellite Data

GSMaP: Global Satellite Mapping of Precipitation



CO^2 Global Distribution Observed by GOSAT



Global distribution map of XCO^2
(FTS SWIR L3 data product)

Summary

- JAXA develops and operates a series of Earth observation satellites for collecting geophysical parameters relating to climate change, water cycle, greenhouse gases, and disaster.
- Regarding JAXA's EO program, there are various types of international collaboration:
  - ✓Joint development
  - ✓Emergency observation
  - ✓Constellation
  - ✓Virtual constellation
  - ✓Multi-satellite data fusion
- International collaboration is essential to realize continuous and comprehensive observations.