Agency Report
JAXA Earth Observation Programs

WGISS-48 @ VAST, Hanoi

Oct. 8th – 11th, 2019

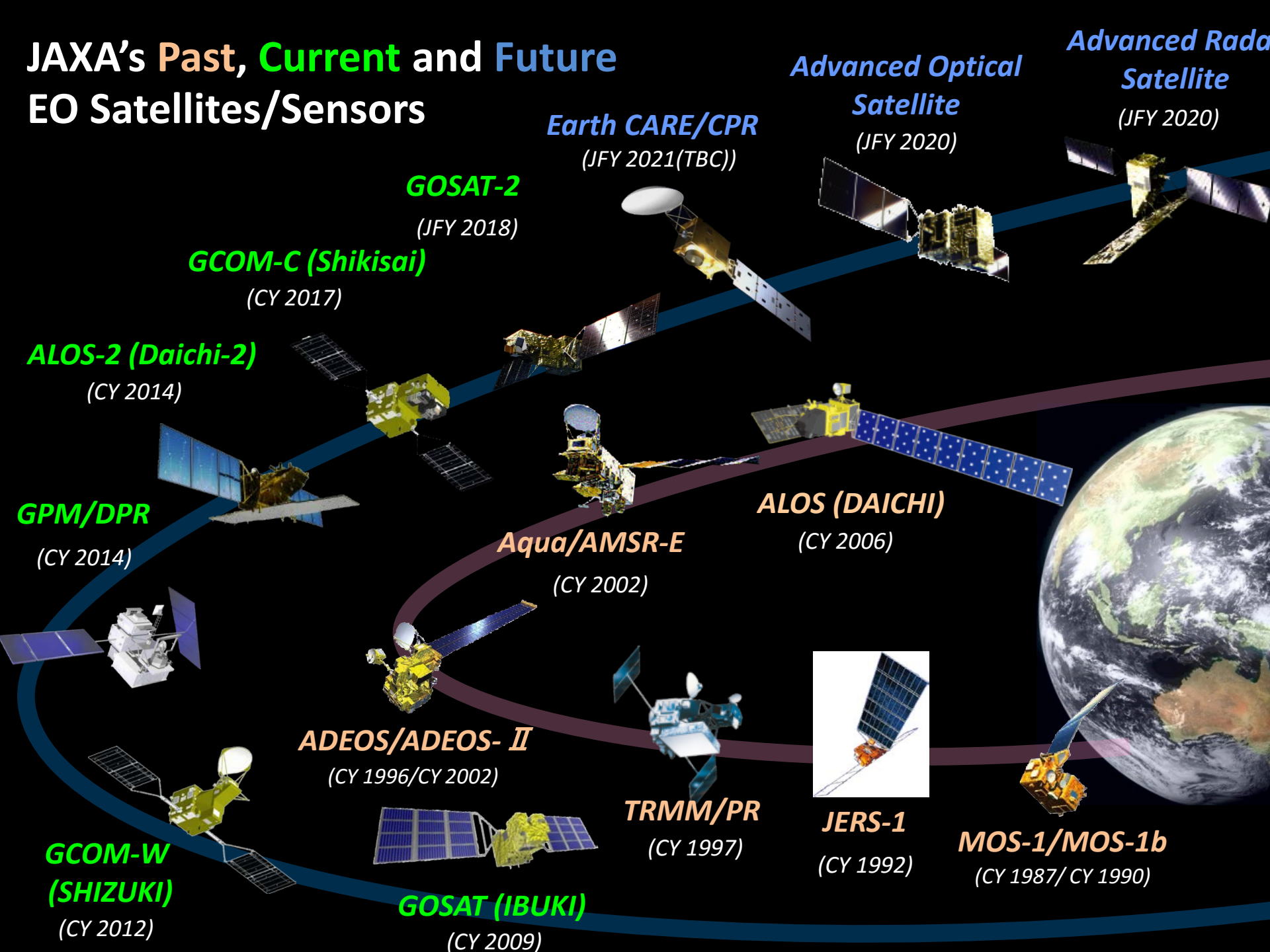
Makoto NATSUISAKA, Yosuke IKEHATA, Kaori KUROIWA, and Masatoshi TAGA

Japan Aerospace Exploration Agency (JAXA)

Satellite Applications and Operations Center (SAOC)

Space Technology Directorate I

JAXA's Past, Current and Future EO Satellites/Sensors



JAXA EO Strategy

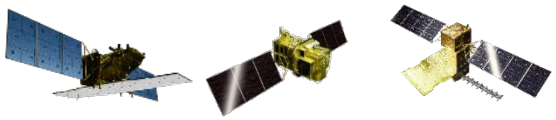
JAXA EO utilization programs since 2018

National Security

Disaster Risk Management

Climate Change

High Resolution Satellites



ALOS-2, ALO-3, ALOS-4

Global Monitoring Satellites

GOSAT, GOSAT-2, GCOM-W, GCOM-C, GPM, EarthCARE

Disaster Risk Management

High Resolution Satellites

ALOS-2

(ALO-3, ALOS-4; under development)

International Charter Space and Major Disasters
https://disasterscharter.org/web/guest/home

Daichi Bousai WEB
http://jaxa-dis.maps.arcgis.com/home/index.html

Sentinel Asia
https://sentinel.tksc.jaxa.jp

- Earthquake
- Flood
- Land Slide

94 organizations from 28 countries/regions and 16 international organizations including VAST

GOJ
Cabinet Office

Local Governments

MLIT
Ministry of Land, Infrastructure, Transport and Tourism

防衛省・自衛隊
MINISTRY OF DEFENSE

警察庁
National Police Agency

FDMA
Fire and Disaster Management Agency
of the Ministry of Internal Affairs and Communications

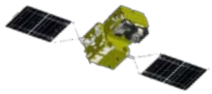
Geospatial Information Authority of Japan (GSI)
Ministry of Land, Infrastructure, Transport and Tourism

Disaster Risk Management

High Resolution Satellites

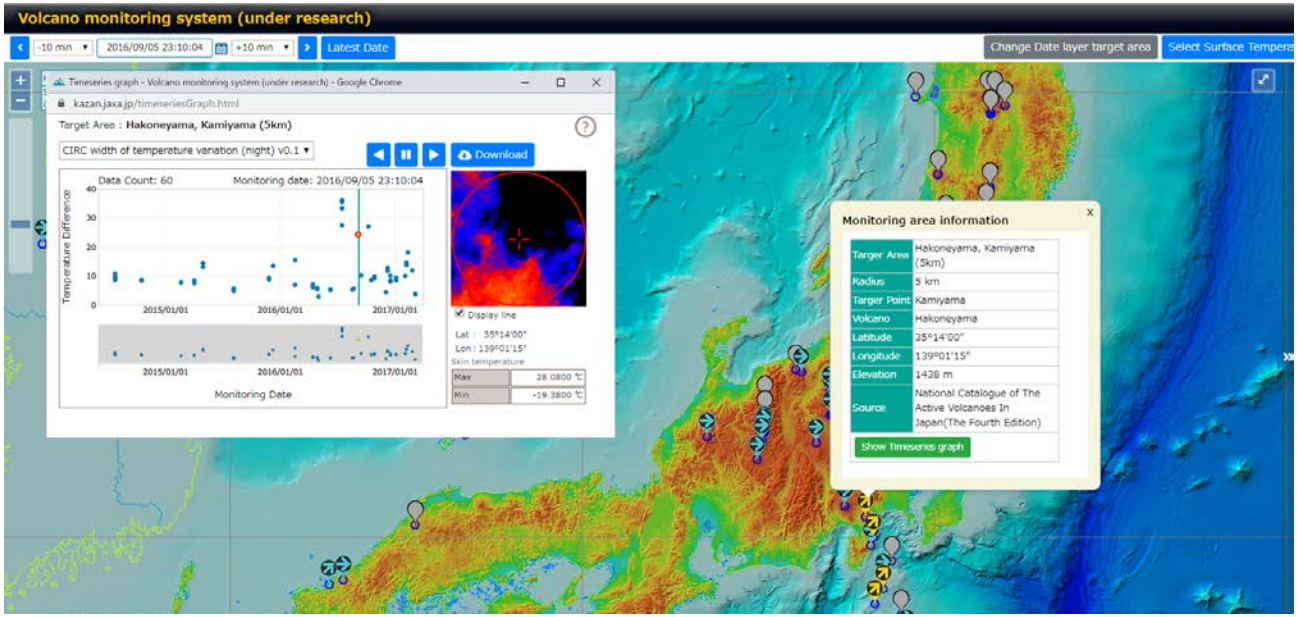
CIRC/ALOS-2

(ALO-3, ALOS-4; under development)



GCOM-C

Before introducing satellite observation, ground monitoring was only for 50 active volcanos out of 111 ones in Japan and IR monitoring was limited only for 28 ones. Continuous observations of submarine volcanos were difficult.



Volcano Monitoring System
https://kazan.jaxa.jp/

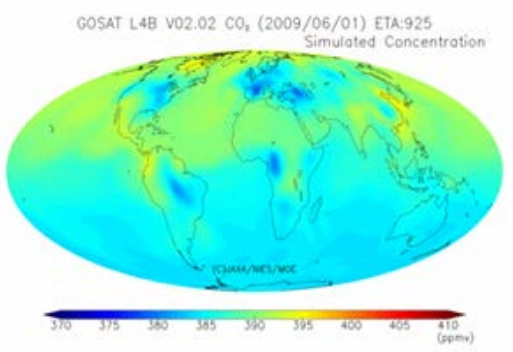
- Volcanic Eruption

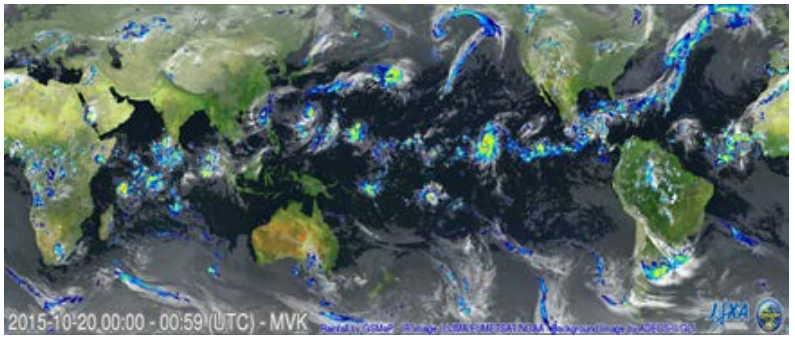
気象庁
Japan Meteorological Agency

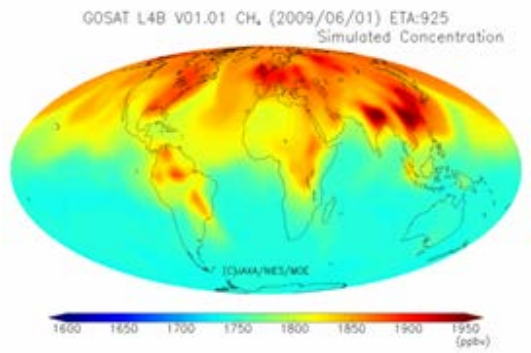
A new service on volcanic eruption was released!

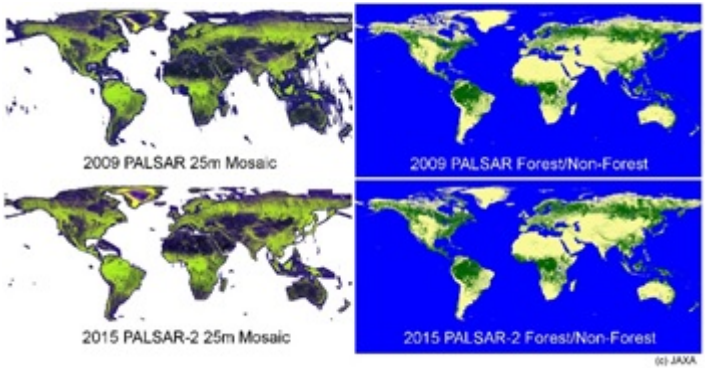
Climate Change

- The “Climate Change Program” consists of three sub programs as follows.
  - (a) Green House Gases observation,
  - (b) Global Satellite Precipitation Map (GSMaP),
  - (C) Global Forest Monitoring.
- JAXA contributes to the international efforts lead by GEO, IPCC, etc.









National Security

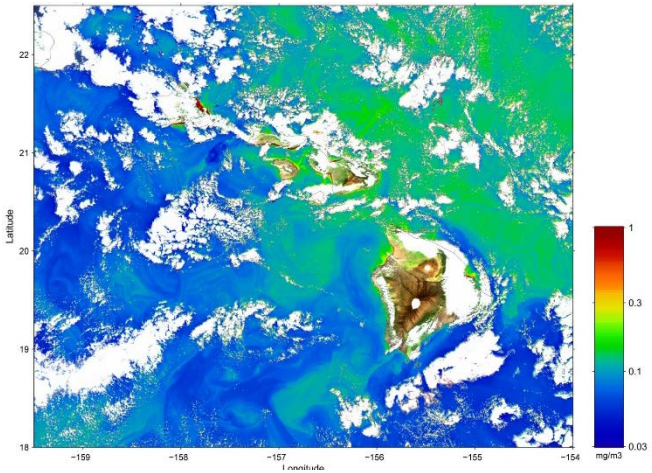
- JAXA released a new GIS service "J-CORE" to unify oceanic information like SST, Chlorophyll, SSH, ocean current, etc. in April, 2019.
- The service also contributes to "MDA (Maritime Domain Awareness) Situational Indication Linkages" operated by GOJ (Government of JAPAN).

J-CORE : Ocean
https://jcore.info/

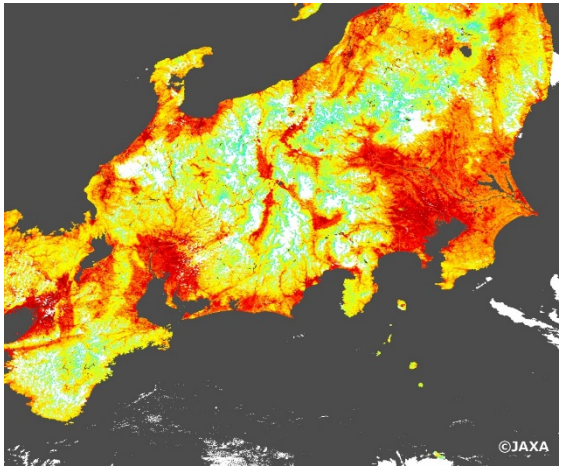
GCOM-C Product Release

- GCOM-C products have started to be distributed from G-Portal since Dec., 2018.
- SGLI (Second generation GLobal Imager) has 19 bands from 380nm to 12,000nm.
- Spatial Resolution : 250m→Highest resolution among optical multiband imagers continuously monitoring the Earth!
- Swath：1150km（visible）, 1400km（IT）（enabling a scan of the whole globe once two days）

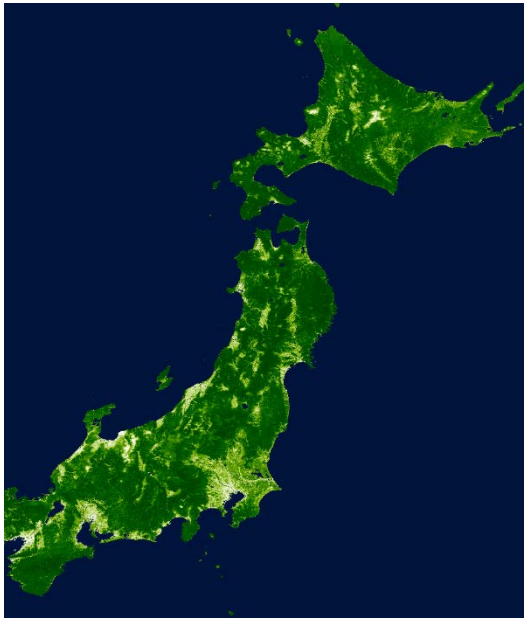
GCOM-C (Global Climate Observation Mission – Climate)
SGLI (Second generation GLobal Imager)



Chlorophyll-a at 250m resolution



Land Surface Temperature



NDVI

GCOM-C Product Release

Common	
Radiance	• TOA radiance (including system geometric correction)

✓ **GCOM-C products contribute to global monitoring for the climate change.**

Land	
Reflectance	• Precise geometric correction
	• Atmospheric corrected reflectance
Vegetation and carbon cycle	• Vegetation index
	• Above-ground biomass ECV
	• Vegetation roughness index
	• Shadow index
	• Fraction of Absorbed Photosynthetically available radiation ECV
	• Leaf area index ECV
Temp.	• Surface temperature
Application	Land net primary production
	Water stress trend
	Fire detection index ECV
	Land cover type ECV
	Land surface albedo ECV

Atmosphere	
Cloud ECV	• Cloud flag/Classification
	• Classified cloud fraction
	• Cloud top temp/height
	• Water cloud optical thickness /effective radius
	• Ice cloud optical thickness
	Water cloud geometrical thickness
Aerosol ECV	• Aerosol over the ocean
	• Land aerosol by near ultra violet
	• Aerosol by Polarization
Radiation budget ECV	Long-wave radiation flux
	Short-wave radiation flux

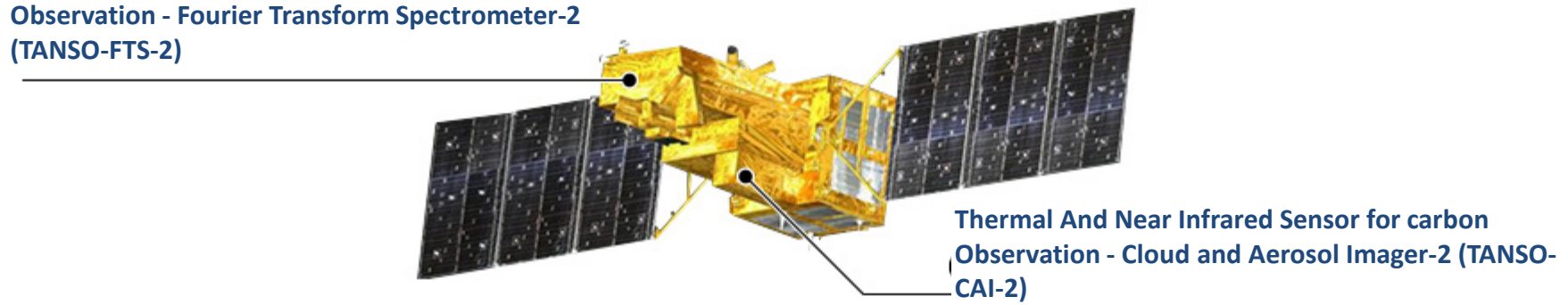
Ocean	
Ocean color ECV	• Normalized water leaving radiance
	• Atmospheric correction parameter
	• Photosynthetically available radiation
	Euphotic zone depth
In-water	• Chlorophyll-a conc.
	• Suspended solid conc.
	• Colored dissolved organic matter
In-water	Inherent optical properties
Temp.	• Sea surface temp. ECV
Application	Ocean net primary productivity
	Phytoplankton functional type
	Redtide
	multi sensor merged ocean color
	multi sensor merged SST

Cryosphere	
Distribution	• Snow and Ice covered area ECV
	• Okhotsk sea-ice distribution
	Snow and ice classification
	Snow covered area in forest and mountain
Surface properties	• Snow and ice surface Temperature
	• Snow grain size of shallow layer
	Snow grain size of subsurface layer
	Snow grain size of top layer
	Snow and ice albedo ECV
	Snow impurity
	Ice sheet surface roughness
Boundary	Ice sheet boundary monitoring ECV

Blue: standard products
Red: research products

GOSAT-2 "IBUKI-2"

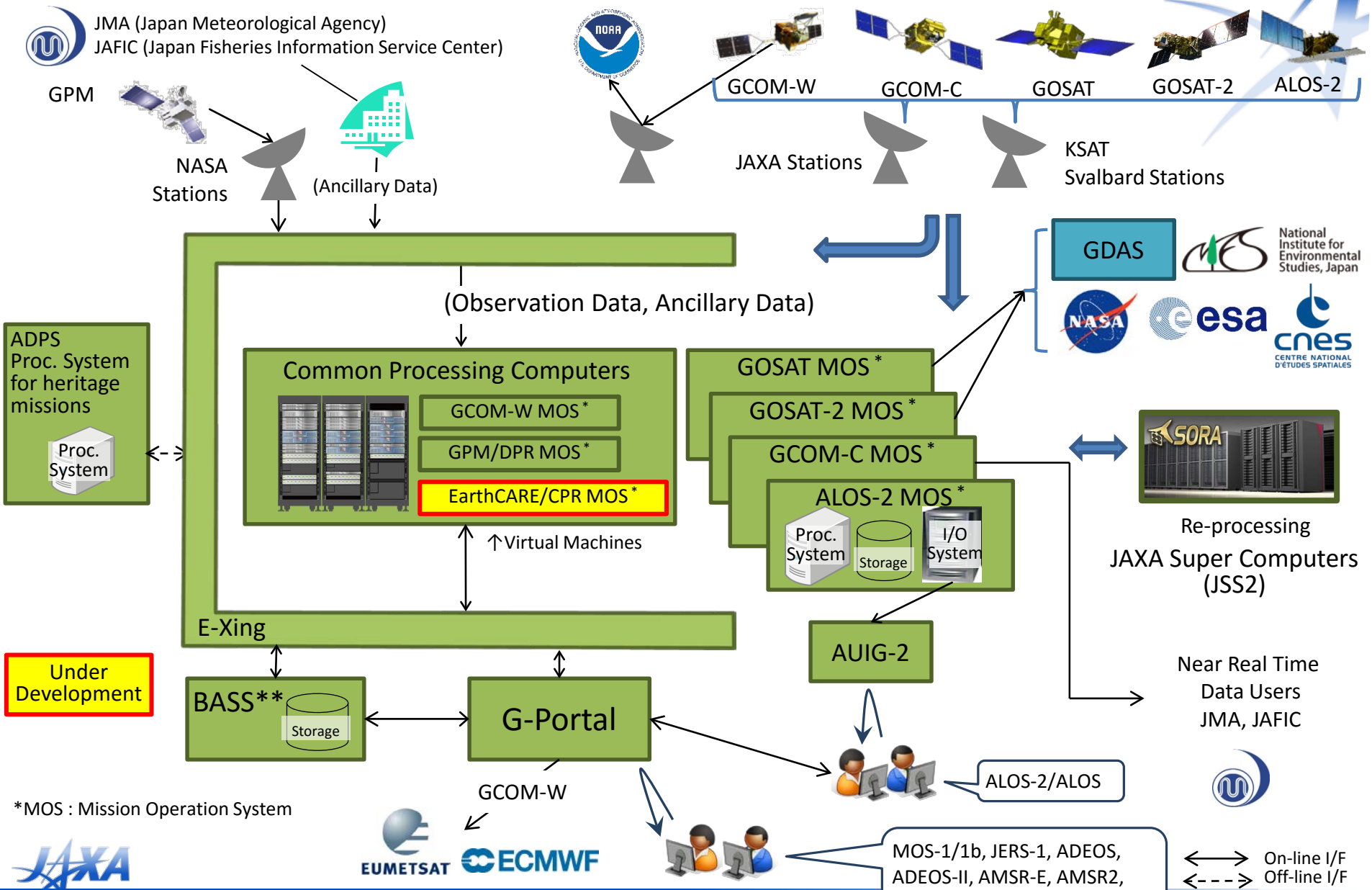
- GOSAT-2 (Greenhouse gases Observing SATellite-2) launched in Oct., 2018 is a joint mission with Ministry of the Environment (MOE) and National Institute for Environmental Studies (NIES)
- Global monitoring of the greenhouse gas emissions, as well those inventories
- Global monitoring of aerosols like PM2.5
- Joint calibration / validation with NASA OCO-2
- **L1B products were released in Aug., 2019. The products can be downloaded from GOSAT-2 Product Archive (NIES site).**
  https://prdct.gosat-2.nies.go.jp
- **L2B ones will be released in Nov., 2019.**



GOSAT-2 "IBUKI-2"

	GOSAT-2	GOSAT
Observation Targets	Carbon dioxide, methane, carbon monoxide -> Examine the feasibility of the estimation of the anthropogenic emission	Carbon dioxide, methane
Instruments	Thermal And Near Infrared Sensor for carbon Observation - Fourier Transform Spectrometer-2 (TANSO-FTS-2)	Thermal And Near Infrared Sensor for carbon Observation - Fourier Transform Spectrometer (TANSO-FTS)
	Thermal And Near Infrared Sensor for carbon Observation - Cloud and Aerosol Imager-2 (TANSO-CAI-2)	Thermal And Near Infrared Sensor for carbon Observation - Cloud and Aerosol Imager (TANSO-CAI)
Observation Accuracy	0.5 ppm (carbon dioxide) and 5 ppb (methane) at a 500-km mesh over land a month and a 2000-km mesh over ocean a month	4 ppm (carbon dioxide) and 34 ppb (methane) at a 1,000-km mesh over land per 3 month
Size	5.3m(X) x 2.0m(Y) x 2.8m(Z) (16.5m(Y))（when expanded in orbit)	2.4m（X）x 2.6m（Y）x 3.7m（Z） （13.7m（Y））
Weight	1,800 kg	1,750 kg
Generated Power	5,000 W	3,770W
Design life	5 years	5 years
Altitude	613km	666km
Repeat Cycle	6 day	3 day

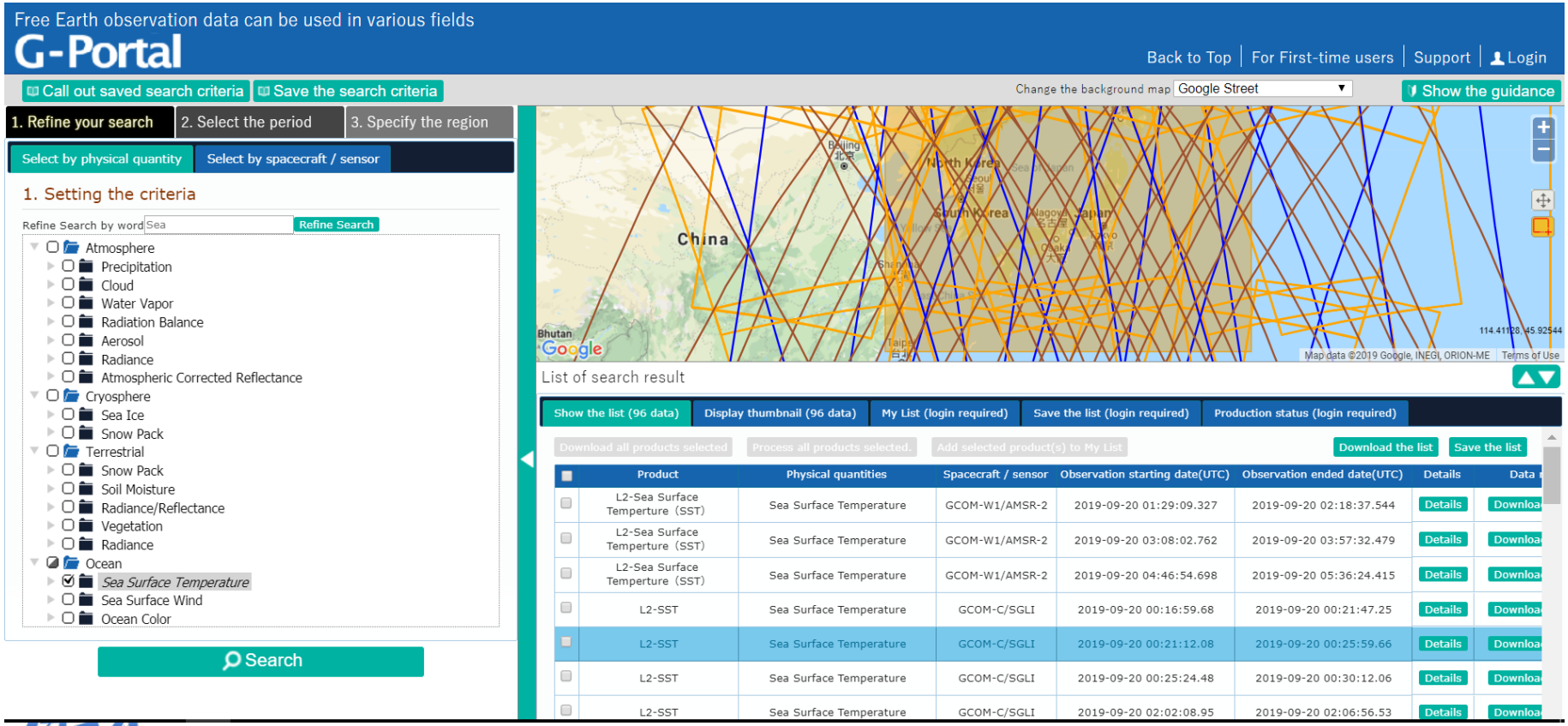
Ground Segments for the JAXA EO Satellites



** Total Archived Data … 6.4PB, Data Provision in JFY2018 … 21,051,270 scenes

G-Portal

- https://gportal.jaxa.jp/gpr/
- G-Portal is a core service for search and distribution of the standard products of JAXA Earth observation satellites. It enables physical quantity search, space craft/sensor search, open search (not fully compatible with CEOS Open search).
- Research products and ones of higher resolution satellites such as ALOS series are distributed from other portals as shown in the next page.



JAXA EO Portals

Thematic Portals

JASMES : Ocean
http://www.eorc.jaxa.jp/JASMES/

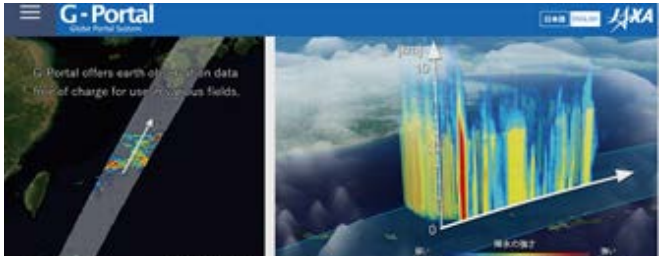
GSMaP : Precipitation
http://sharaku.eorc.jaxa.jp/GSMaP/

GDAS : GHG
https://data2.gosat.nies.go.jp/
NIES Site

J-CORE : Ocean
https://jcore.info/

Disasters -> see “Disaster Risk Management”

Data Providing Portals



G-Portal
https://gportal.jaxa.jp/
JAXA EO Standard Produces

AUIG-2
ALOS/ALOS-2 ProductS

METI Open and Free Platform

- An open and free platform for EO data “Tellus” developed by METI (Ministry of Economy, Trade and Industry) has started to be operated since Feb. 2019.
- JAXA is supporting the activities by providing ALOS/AVNIR-2, ALOS/PALSAR, AW3D30, and GSMaP data to the platform.

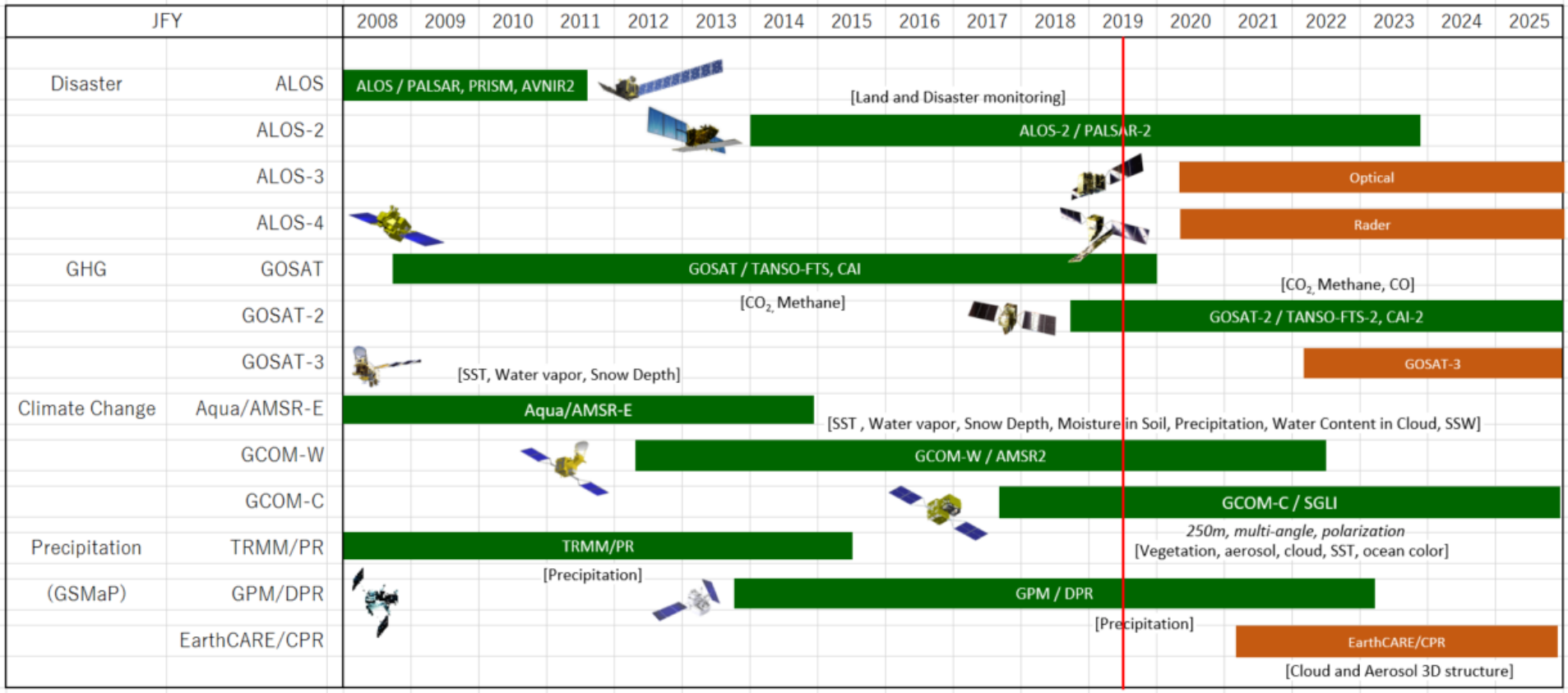
https://www.tellusxdp.com/

xData Alliance

「Tellus」の開発への貢献と利用促進などを目的として組成した
パートナーシップ（協力企業）一覧です。

SAKURA internet
AXELSPACE
ABEJA
G空間情報センター
EXA
北海道オープンデータ推進協議会
B Inc.
jig.jp group
mercari R4D
RESTEC
sojitz
MIZUHO
みずほ情報総研
GEHIRN
spacesystems
SIGNATE
ABBALab
if
IncubateFund
iSGS
Opt Ventures
SPIRAL VENTURES
B DASH VENTURES

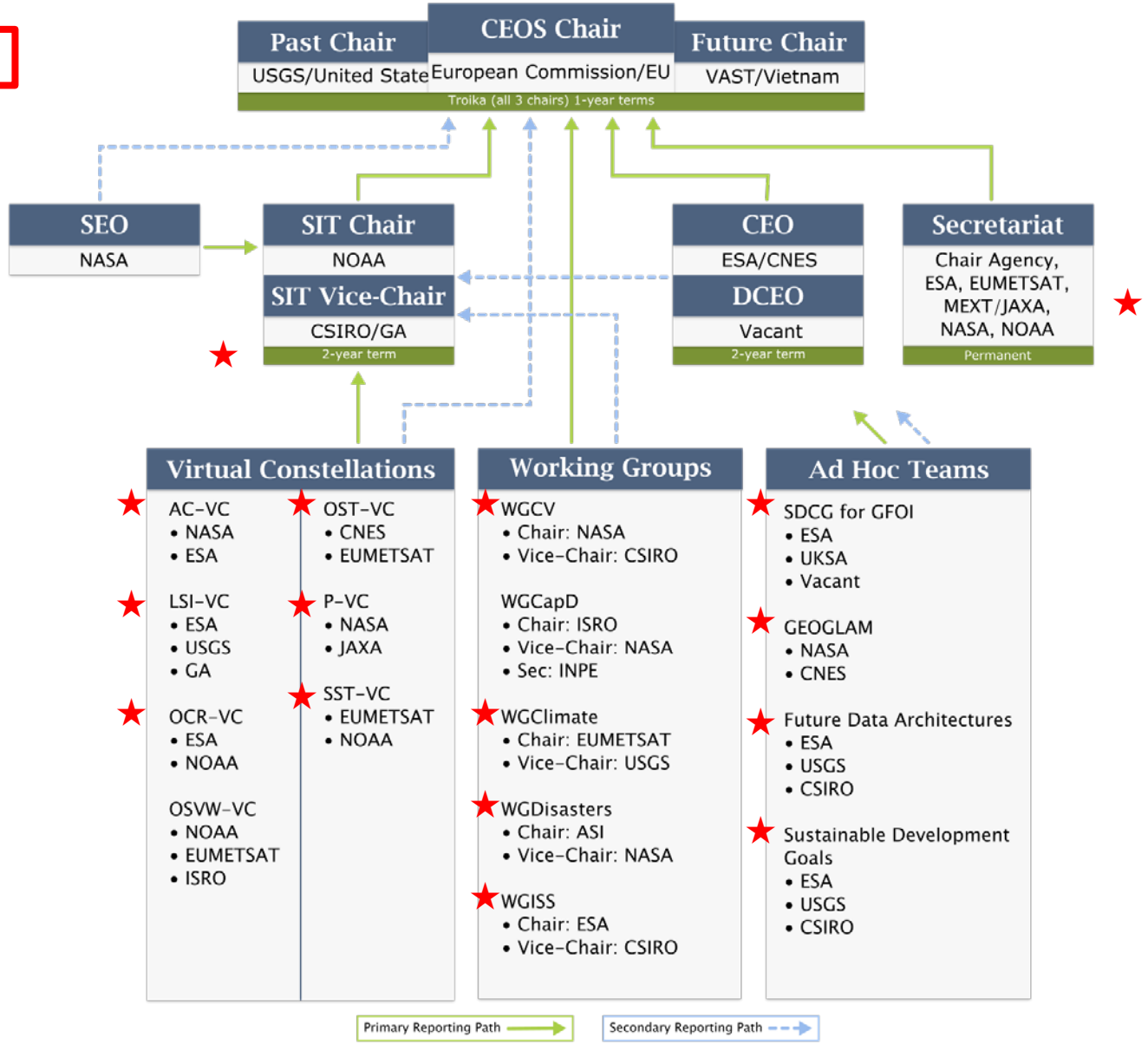
Long-term Plan



https://www8.cao.go.jp/space/plan/plan2/kaitei_fy30/kaitei_fy30.pdf

JAXA Cooperation with CEOS

★ JAXA



Connections with GEO/CEOS Portals

- JAXA considers GEO/CEOS portals as primary gateways to the global users.
- JAXA has already connected G-Portals with GEOSS portals through IDN and FedEO.
- JAXA registered DIF-10 to IDN and updated it to add GCOM-C information.