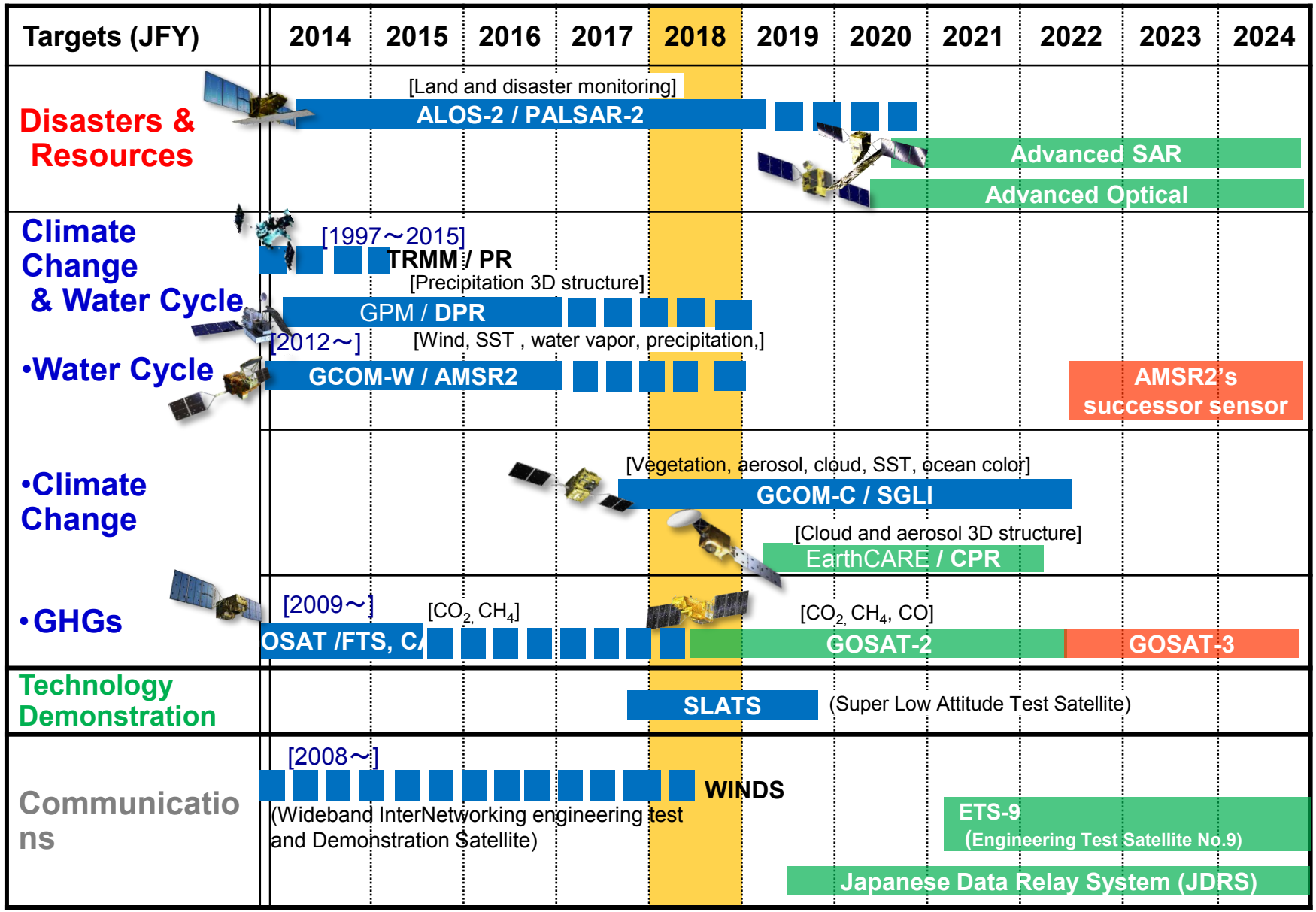
JAXA's Earth Observation Program for Environmental Satellites

October 25, 2018

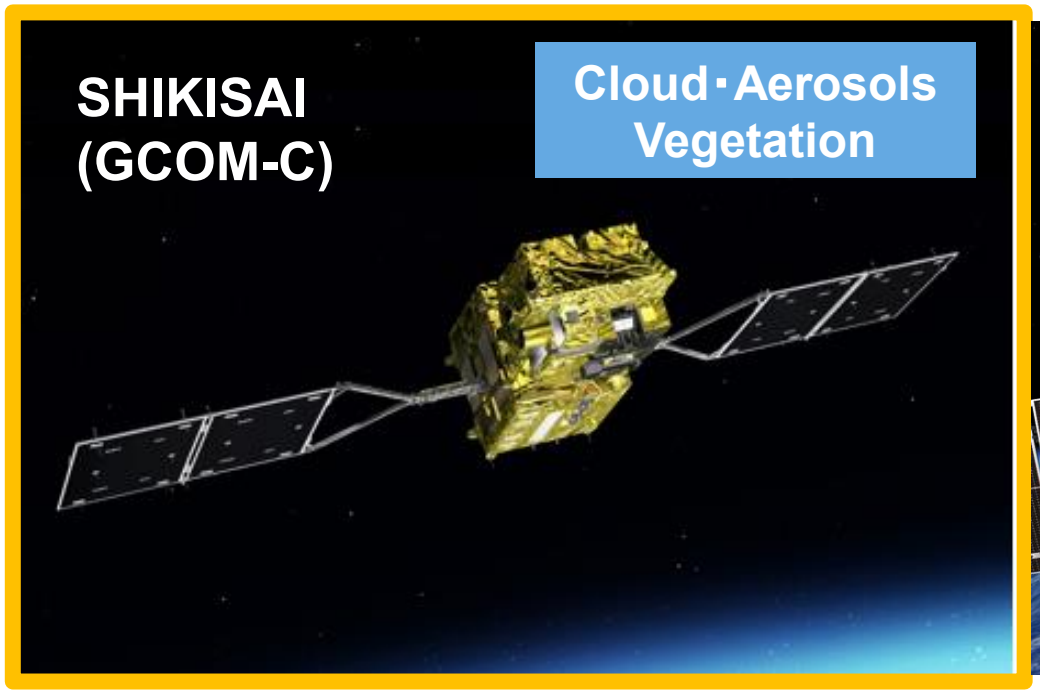
Shin-ichi Sobue

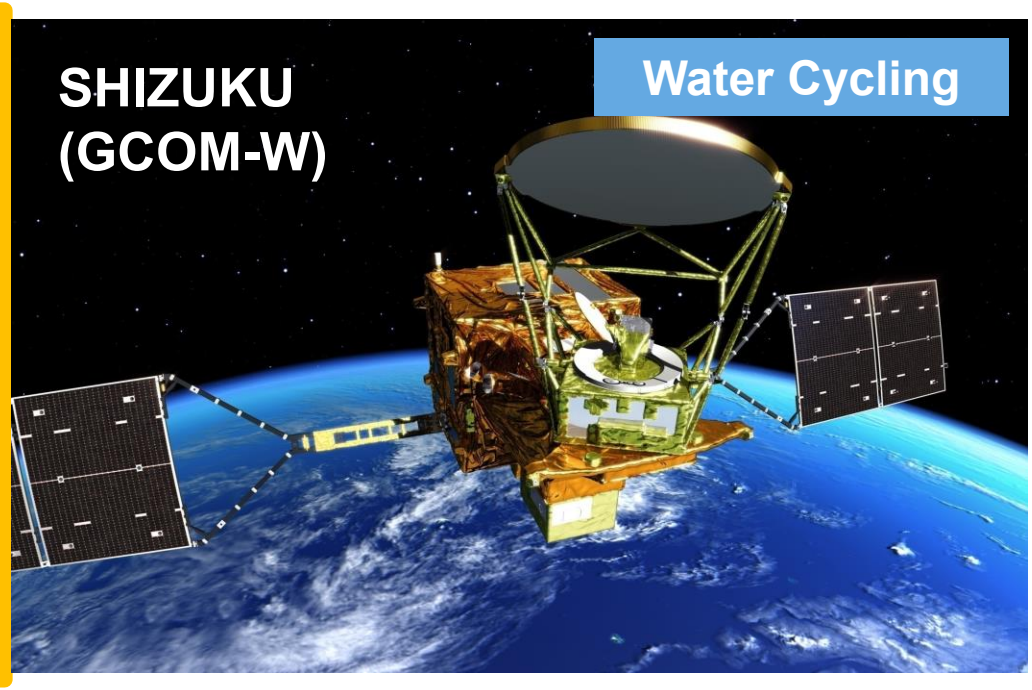
Schedule of JAXA Satellites

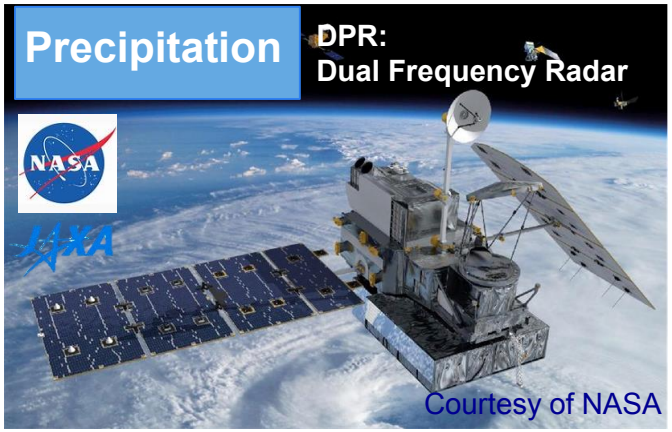


Mission status: On orbit | Extended Life Period | Development | Study

Satellites Contributing to Understanding Global Climate Change







Launched

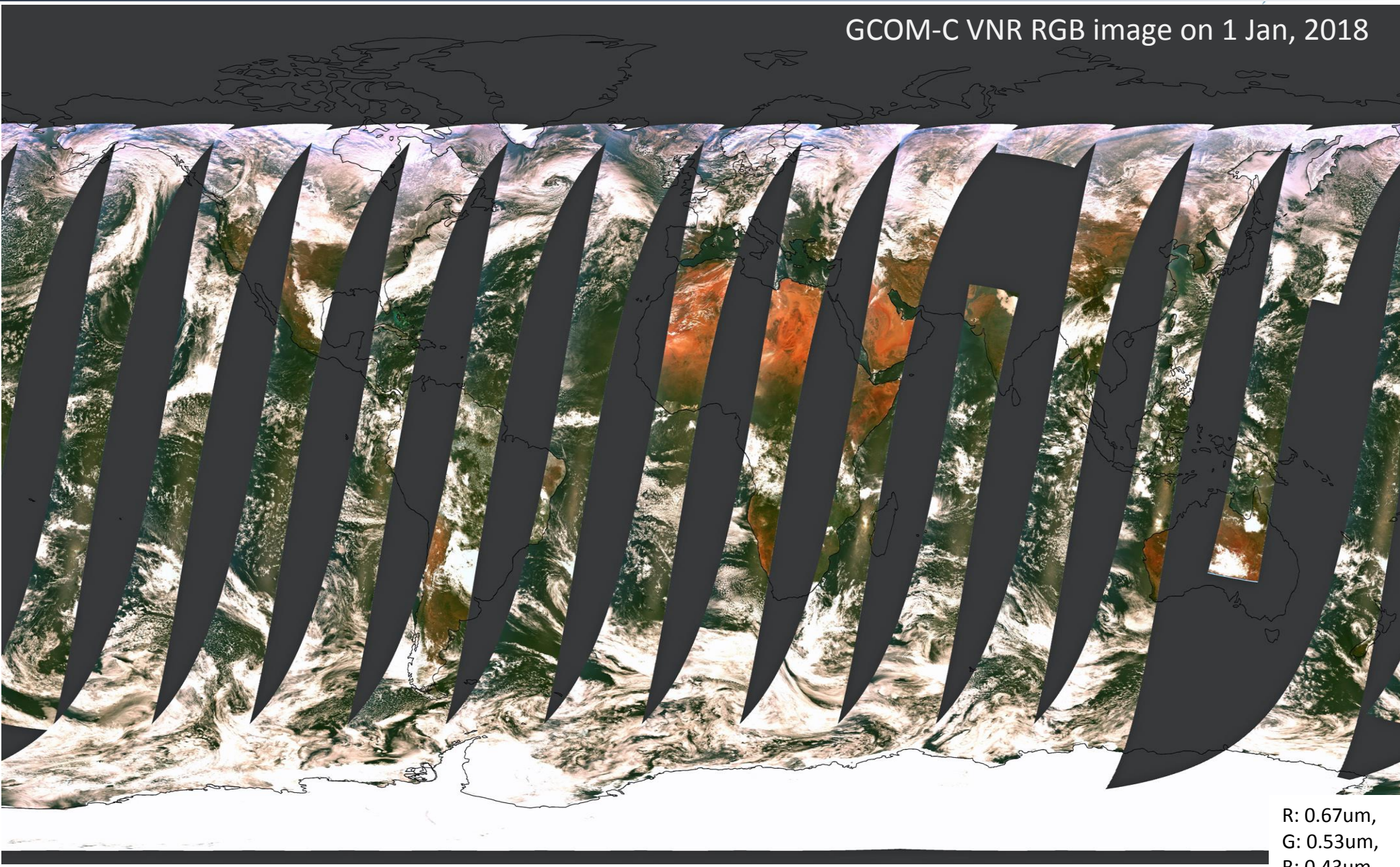
GCOM-C: Global Change Observation Mission- Climate

GCOM-C/SGLI (Second generation GLobal Imager)	
Orbit	Sun-synchronous (descending local time: 10:30), Altitude: 798km, Inclination: 98.6deg
Launch Date	**10:26 (JST), December 23, 2017**
Mission Life	5 years
Scan	Push-broom electric scan (VNR: VN & P) Wisk-broom mechanical scan (IRS: SW & T)
Scan width	**1150km** cross track (VNR: VN & P) **1400km** cross track (IRS: SW & T)
Spatial resolution	**250m** (land and coastal areas), 500m, 1km
Polarization	**3 polarization angles for POL**
Along track tilt	Nadir for VN, SW and TIR, & +/-45 deg for P

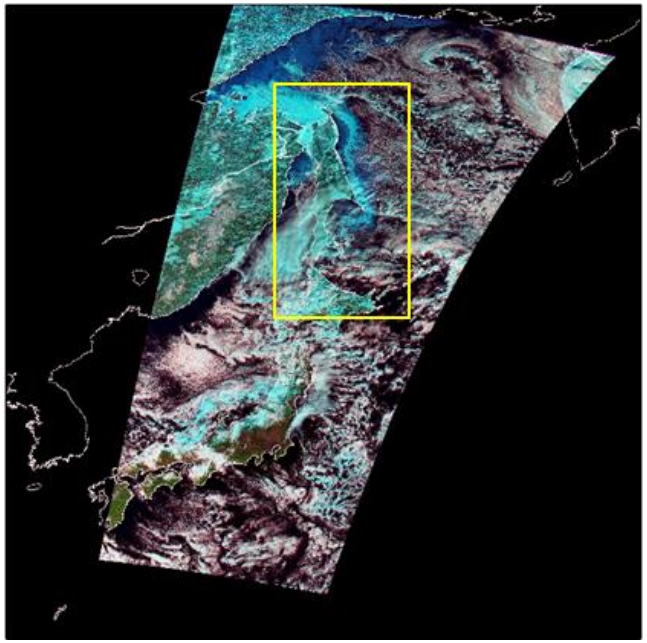
GCOM-C Satellite PFM @ JAXA Tsukuba Space Center

GCOM-C

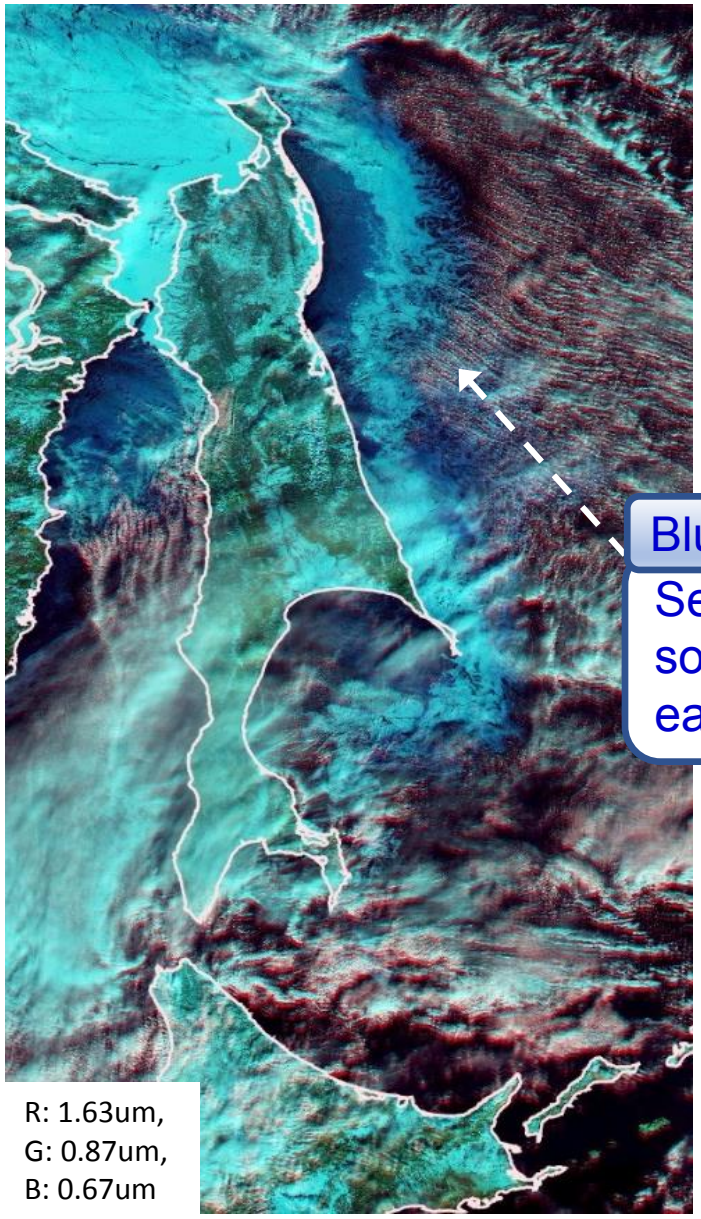
First-light Global Image from GCOM-C



SGLI RGB Images



Pseudo color image around the Japanese archipelago Sea of Okhotsk



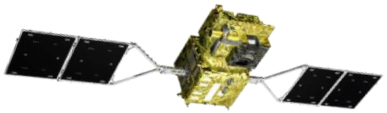
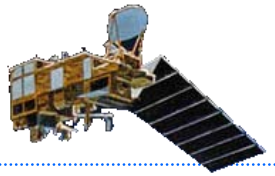
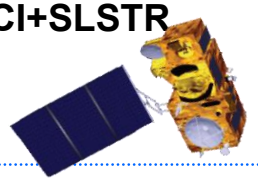
R: 1.63um,
G: 0.87um,
B: 0.67um

Enlarged view of the surrounding area of Sakhalin

Blue area means
Sea ice is moving south along Sakhalin east coast.

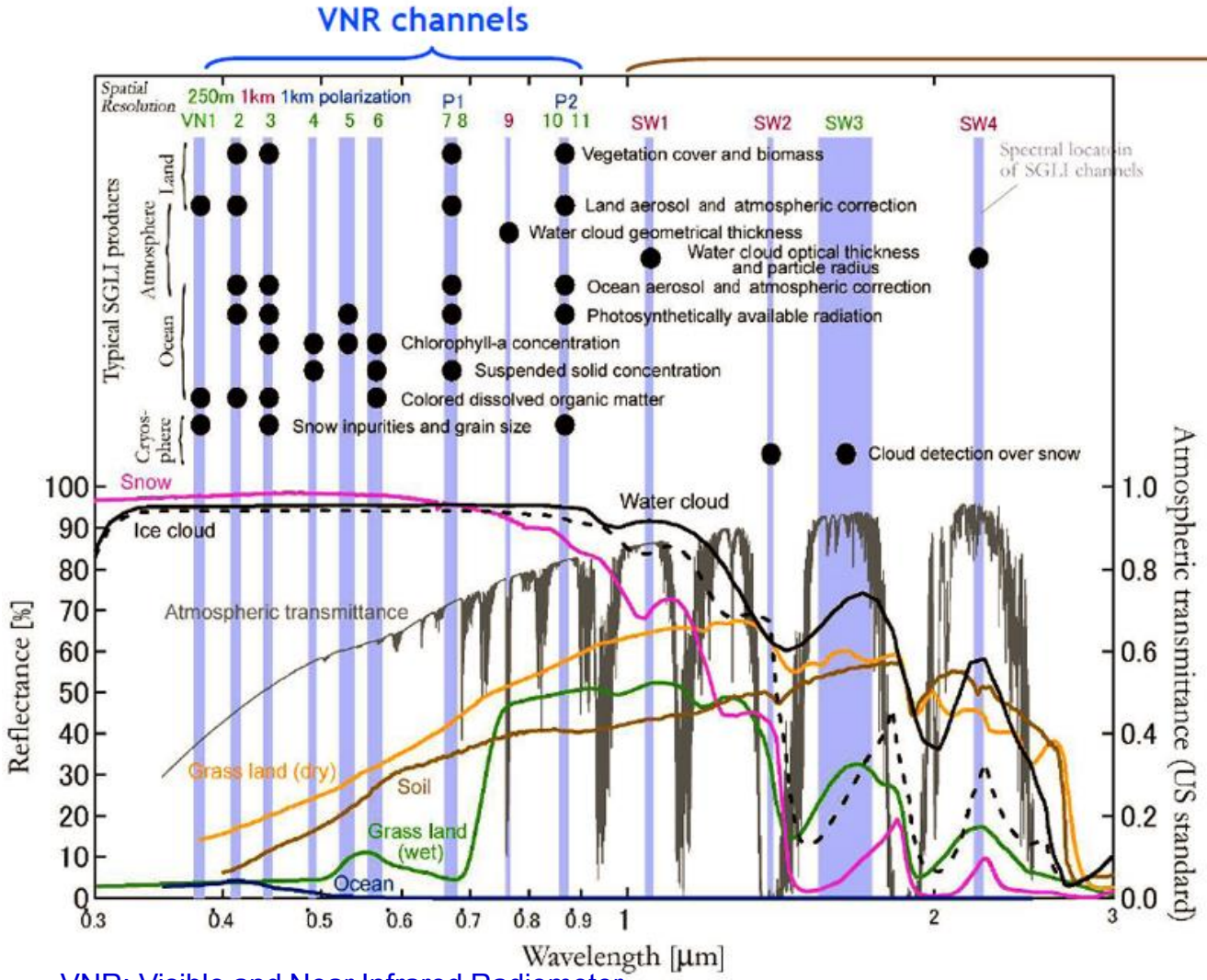
Features & Synergies of SGLI & other similar sensors

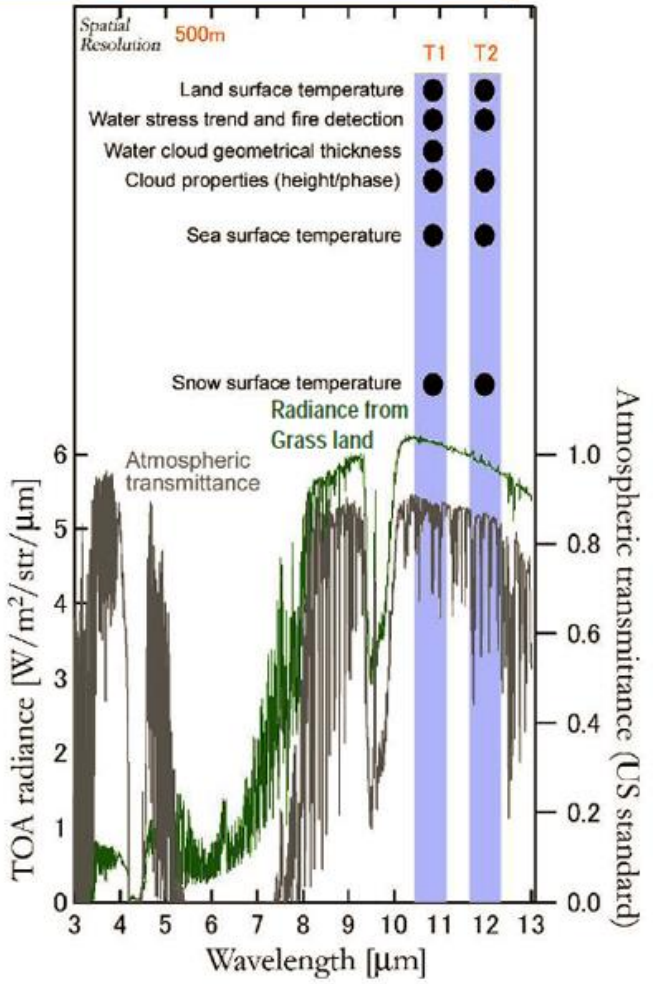
SGLI Key features : High resolution (250m), Near Ultra-Violet Wavelength and Polarization for monitoring aerosols over land surfaces and bi-directional observation for vegetation and biomass

	GCOM-C/ SGLI	VIIRS, MODIS	Sentinel-3/ OLCI+SLSTR
			
Complementally Observations Contributing to Global Coverage	VIS, NIR, TIR (19Ch) Global Observation LST AM10:30	VIS, NIR, TIR (22Ch VIIRS 36Ch MODIS) Global Observation LST PM1:30（Terra AM10:30）	OLCI(21Ch, VIS-NIR) SLSTR(9Ch, VIS-TIR) Global Observation LST AM10:00
	250m resolution (11ch)	375m res for (5ch)	300~500m res
	Near Ultra-Violet		
	Polarization 1㎞ res		
	Bi-directional (2ch) 1km res		Bi-directional（9ch）for high-accuracy land and ocean temperature
		TIR (7ch) Day-Night Band	
	TIR (2ch) 250m res		TIR (3ch)
	1150~1400km Swath	>3000km Swath （2300㎞ MODIS）	1200km Swath

GCOM-C/SGLI Channel Specification and Products

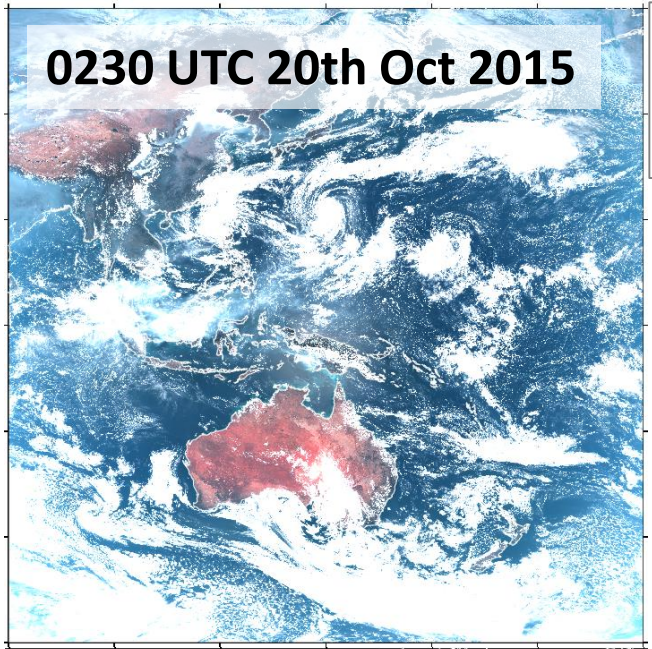
SGLI composed of IRS and VNR enables us to measure 19 different channels and produce 29 products concerning land surface, atmosphere, ocean and ice.

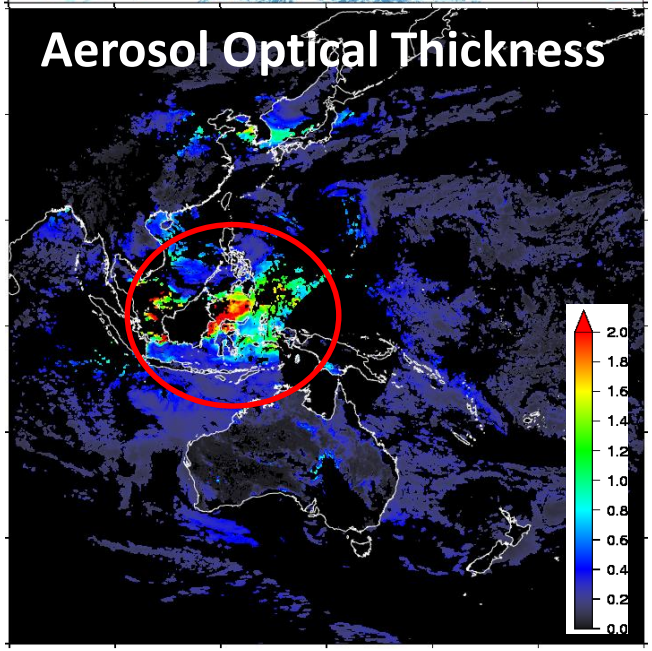




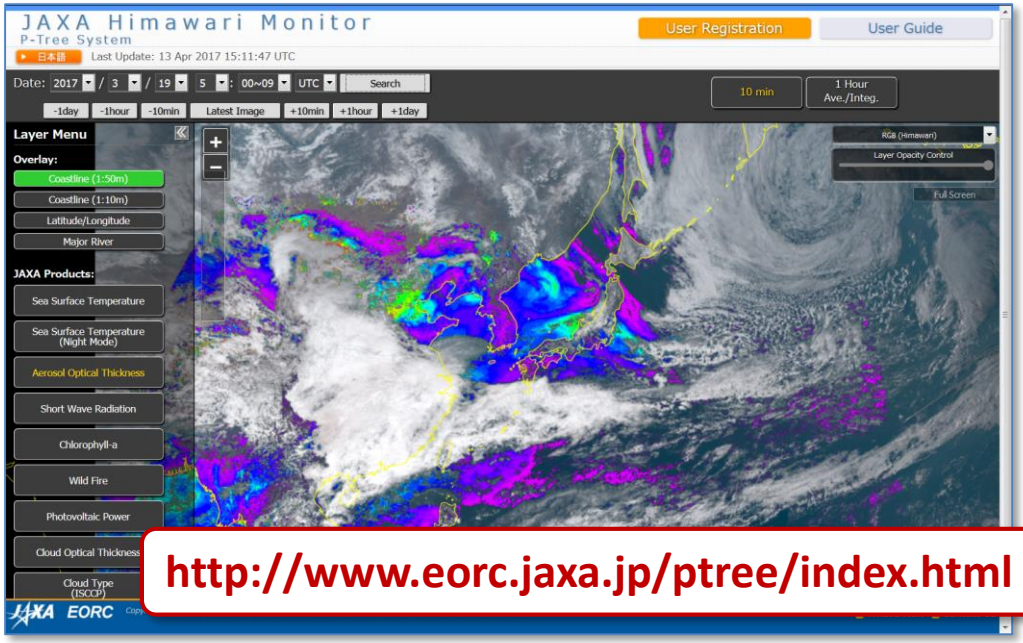
VNR: Visible and Near Infrared Radiometer
IRS: Infrared Scanner

JAXA Himawari Monitor





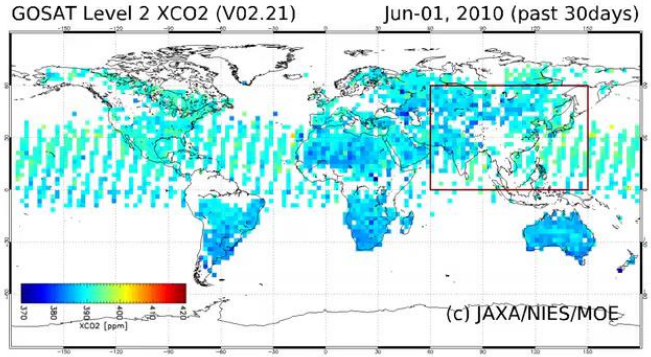
JAXA develops geophysical products from Himawari-8 in collaboration with JMA and research institutes in Japan (Some products are expected to be used in new JAIF project proposal in SCOSA)

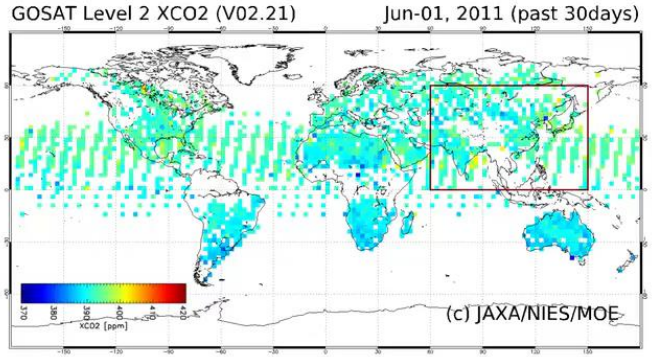


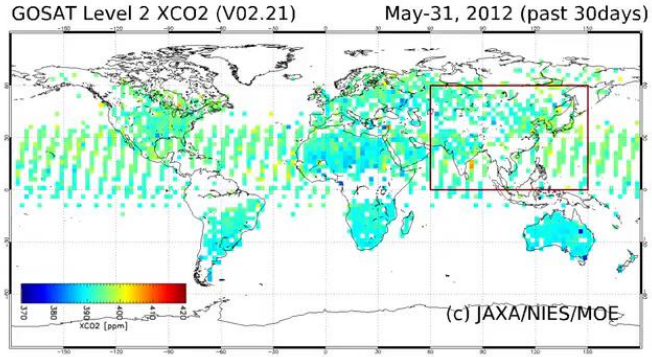
http://www.eorc.jaxa.jp/ptree/index.html

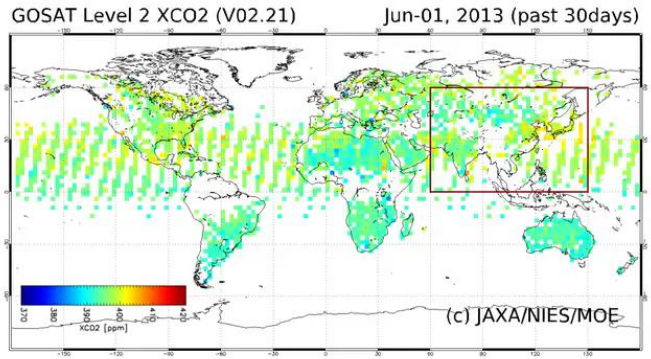
Product List		
L1	Reflectance (6 bands)/Brightness temperature (10 bands)	
L2	Atmosphere	**Aerosol properties**/Cloud properties
	Ocean	Sea surface temperature/Ocean color (Chlorophyll-a)
	Land	**Wild fire (hot spot)**
	Flux	Photosynthetically active radiation (PAR)/Shortwave radiation (SWR)/Photovoltaic Power (image only)

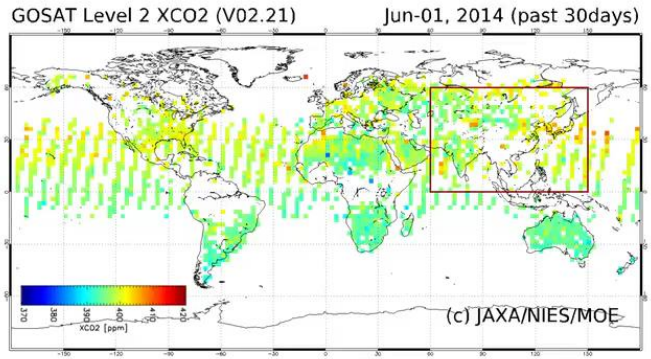
GOSAT: 8-Year Global CO2 Data (2009 – 2016)

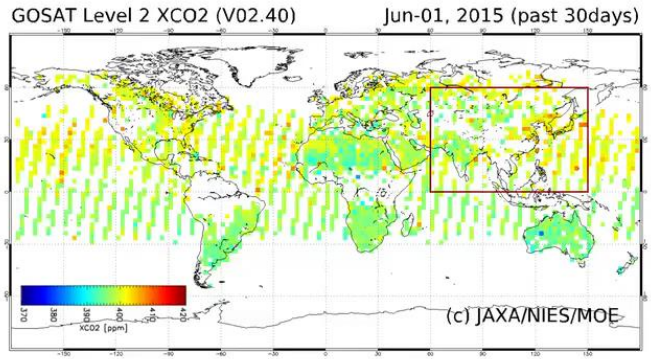


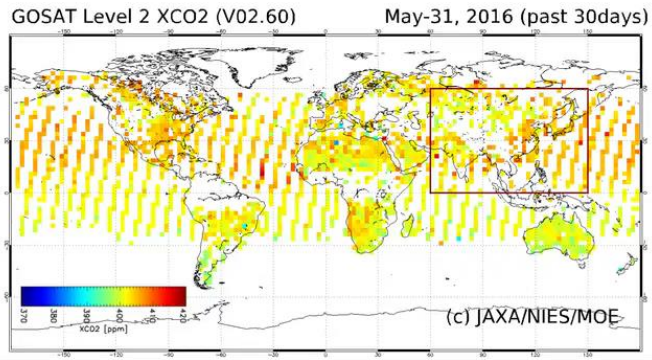


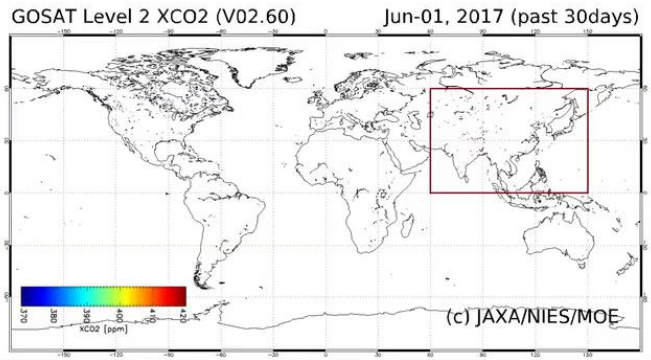


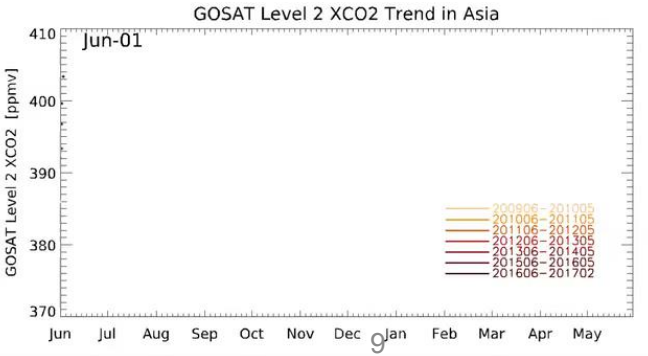












Upgrade from GOSAT to GOSAT-2

Launched in 2009

To be Launched in 2018

	GOSAT	GOSAT-2
Improvement Concentration Measurement **Precision**	4 ppm (CO2) 34 ppb (CH4) per 3 months at 1,000km mesh (land	**0.5 ppm (CO2)** **5 ppb (CH4)** **per 1 month** **at 500 km mesh (land)** **at 2,000 km mesh (ocean)**
Improvement Estimation **Accuracy** of Flux	Reduce the annual estimation error to half compared with the existing estimation error -sub-continental scale	**Estimate the monthly net fluxes with the accuracy of ±100%** **at 1,000 km mesh (land)** **at 4,000 km mesh (ocean)** **(>±0.2GtC/area/year)**
New Estimation of **Anthropogenic Emission**	---------	**Examine the feasibility of the estimation of the anthropogenic emission with the observation of CO which is the correlated matter**
New Monitoring **Aerosols** in the Atmosphere	---------	**Calculate the optical thickness of the aerosols at 550nm and 1.6μm with 0.1 accuracy (for estimation of the moving state of the PM2.5)**

Essential Climate Variables measured by GCOM-C & W, GPM/DPR, GOSAT

Measured by GCOM-C | Measured by GCOM-W | Measured by GPM/DPR | Measured by GOSAT

Atmospheric

Surface	Upper-air	Composition
Air temperature	**Temperature**	**Carbon dioxide**
Wind speed & direction	**Wind speed & direction**	**Methane**
Water vapour	**Water vapour**	**& other long-lived GHGs ***
Pressure	**Cloud properties**	**Ozone & Aerosol**
Precipitation	**Earth radiation budget (including**	**supported by their precursors ****
Surface radiation budget		

* including N2O, CFCs, HCFCs, SF6, PFCs
** in particular NO2, SO2, HCHO, CO

Terrestrial

River discharge
Water use
Groundwater
Lakes
Snow cover
Glaciers and ice caps
Ice sheets
Permafrost
Albedo
Land cover (including vegetation type
Fraction of absorbed photosynthetically active radiation (FAPR)
Leaf area index (LAI)
Above-ground biomass
Soil carbon
Fire disturbance
Soil moisture

Oceanic

Surface	Sub-surface
Sea-surface temperature	Temperature
Sea-surface salinity	Salinity
Sea level	Current
Sea state	Nutrients
Sea ice	
Surface current	
Ocean colour	
CO2 partial pressure	CO2 partial pressure
Ocean acidity	Ocean acidity
Phytoplankton	
	Oxygen
	Tracers

Total Essential Climate Variables (ECVs) (ECVs largely dependent on satellite observations identified by CEOS and GCOS are shown in **bold**.)	50
ECVs measured by GCOM-C, GCOM-W, GPM/DPR and GOSAT	**23**


Thank you for your attention.
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