

The image shows the GOSAT satellite in orbit. The satellite has a central body covered in gold thermal insulation and two large, rectangular solar panel arrays extending outwards. The panels are blue with a grid pattern. The background is a dark space with a thin blue and white horizon line representing Earth's atmosphere.

GOSAT

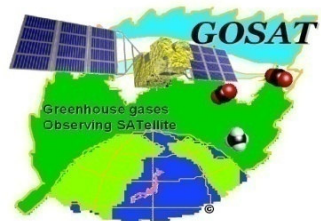
**Greenhouse Gases Observing Satellite “IBUKI”
and its contribution to improve our understanding of
global warming**

**United Nations Committee on the Peaceful Use of Outer Space
UN COPUOS**

Scientific and Technical Subcommittee , 46 session

Vienna, 9-20 February 2009

**Dr. Takashi Moriyama
Fellow, Earth Observation Programme coordinator
Japan Aerospace Exploration Agency (JAXA)**

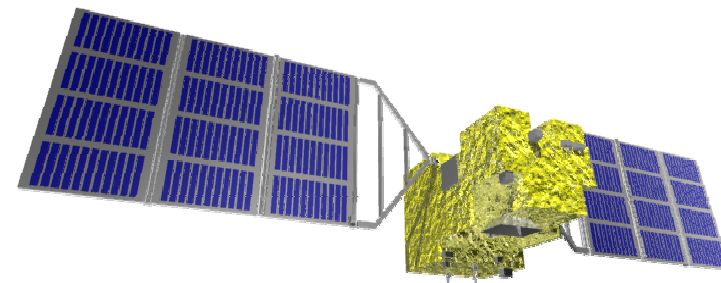


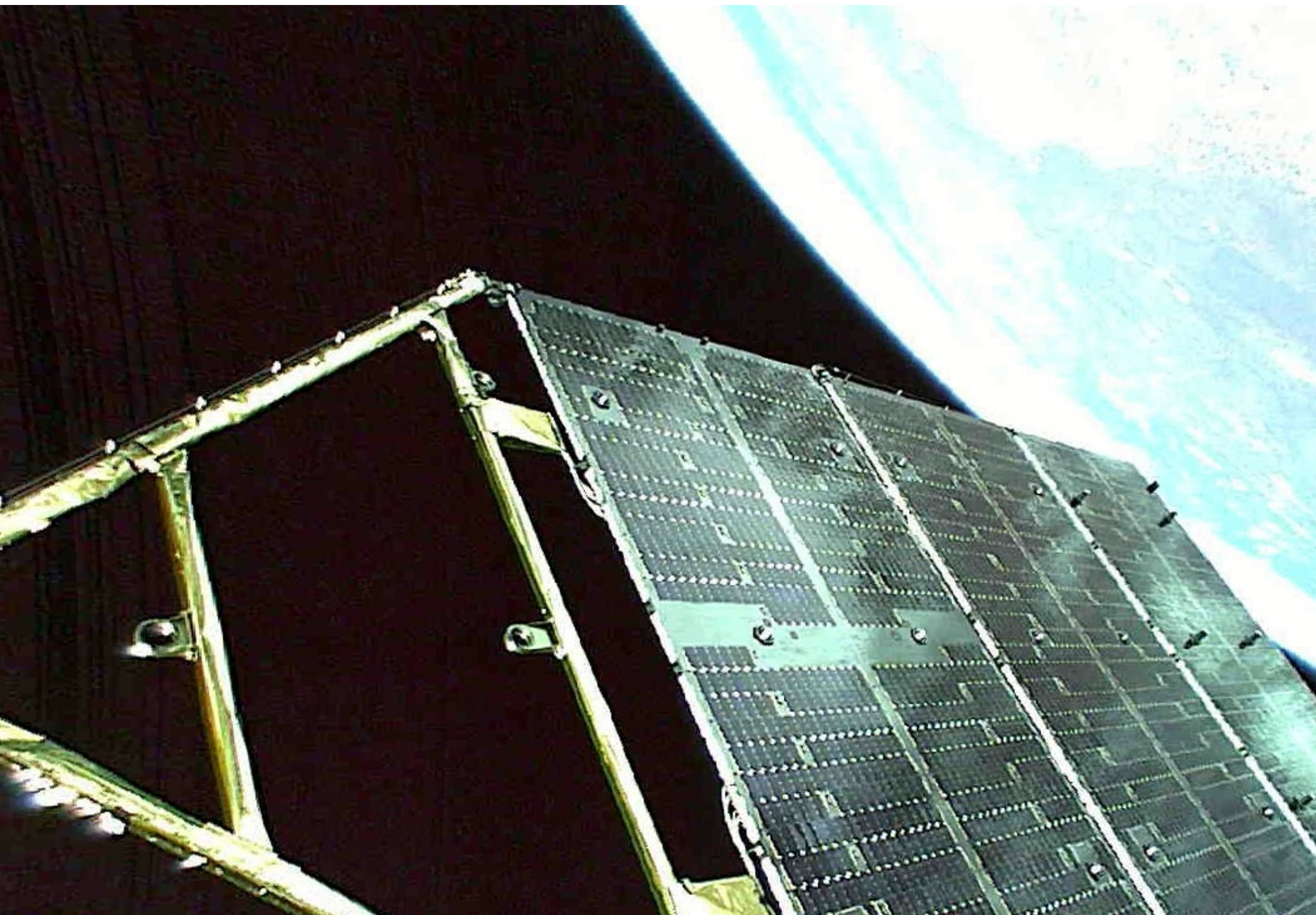
GOSAT Satellite and Launcher

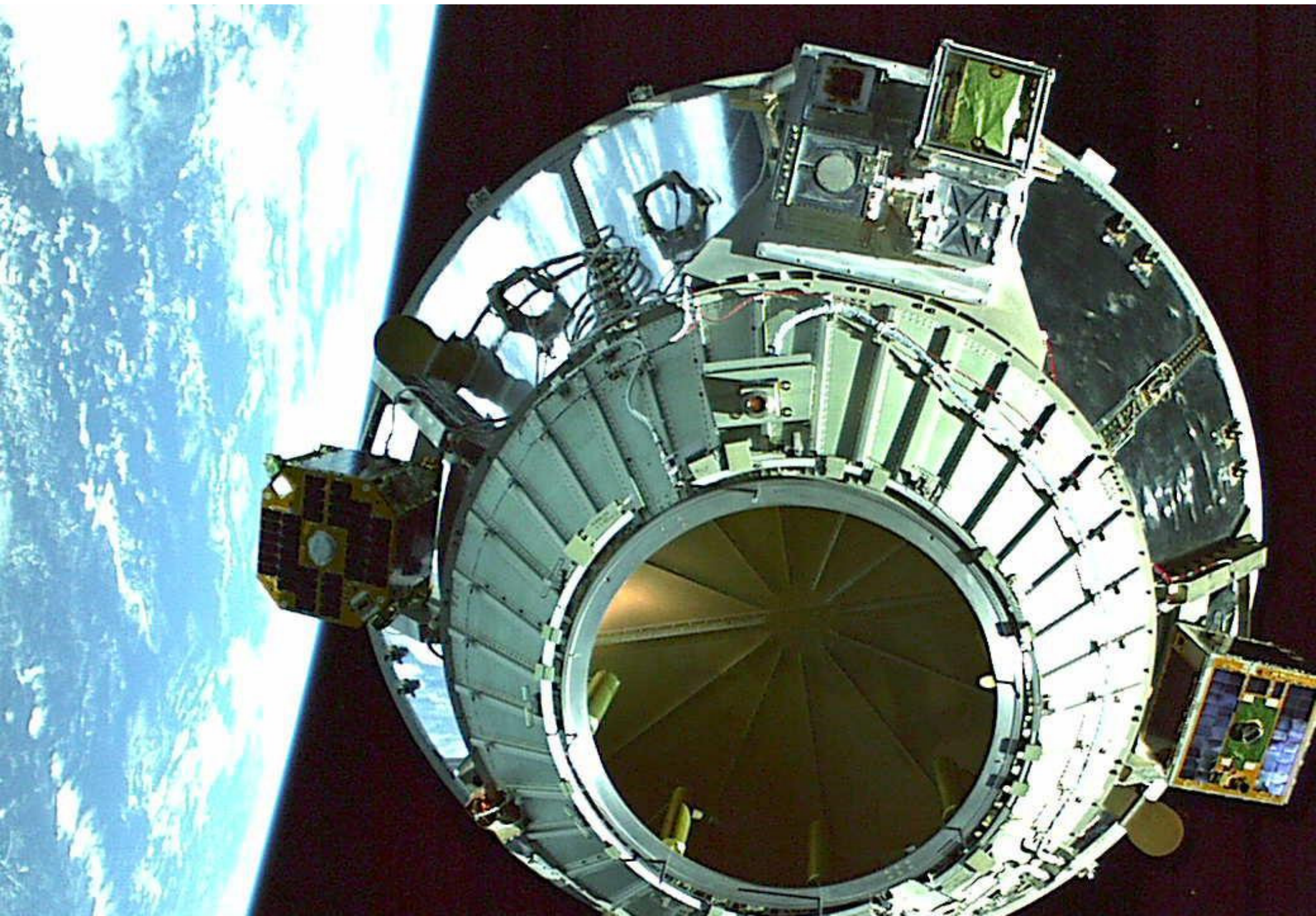
空へ挑み、宇宙を拓く



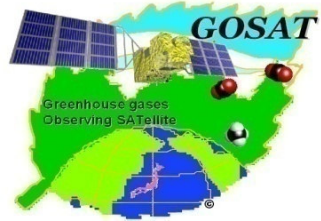
Size	Main body	1.5 x 2 x 3.2 m
Mass	Total	1750kg
Power	Total	4400W
Life	5 years	
Orbit	Sun Synchronous Orbit	
	Local time	12:54
	Altitude	666km
	Inclination	98deg
	Re-visit	3 days
Launch	Vehicle	H-IIA
	Date	23 rd Jan.2009





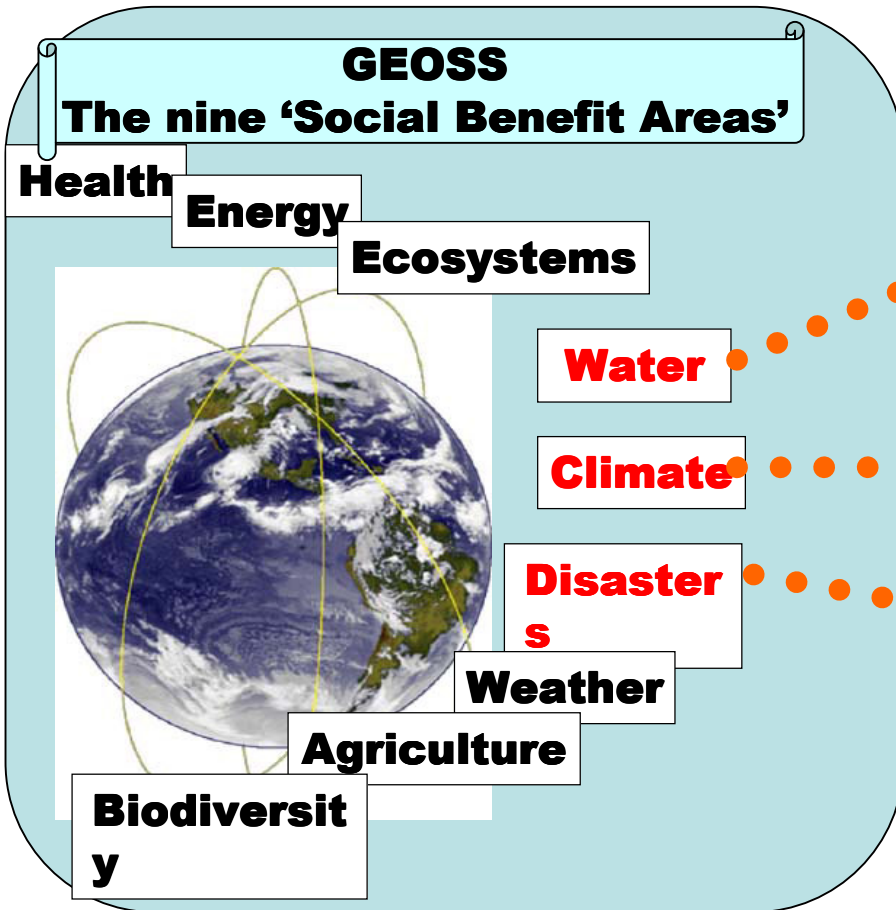


JAXA contribution to GEO



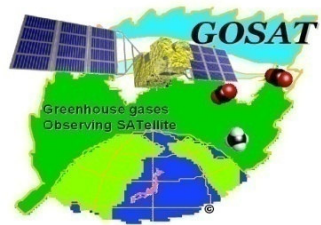
To develop and operate an Earth Observation System for GEOSS

A plan of advanced low Earth orbit satellites



Water SBA	Dual-frequency Precipitation Radar (GPM) [2012] With NASA
	AMSR2 (GCOM-W) [2011] With NASA
	Cloud Profiling Radar (EarthCARE) [2012] With ESA
	SGLI (GCOM-C) [2013]
Climate SBA	Greenhouse Gases Observation Sensor (GOSAT) [2009]
Disaster SBA	SAR (ALOS, disaster monitoring satellites), Optical Sensor (ALOS, Geo-stationary EO satellite) [2006(ALOS)]

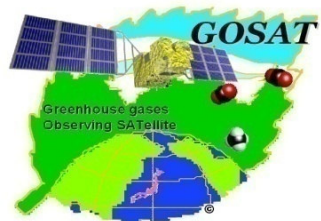
SBA : Societal Benefit Area



Introduction



- GOSAT is
 - the Greenhouse gases Observing SATellite.
 - the satellite to monitor the global distribution of Green House Gases (GHG).
 - the joint project of
 - Japan Aerospace Exploration Agency (JAXA),
 - Ministry of Environment (MOE), and
 - National Institute for Environmental Studies (NIES).

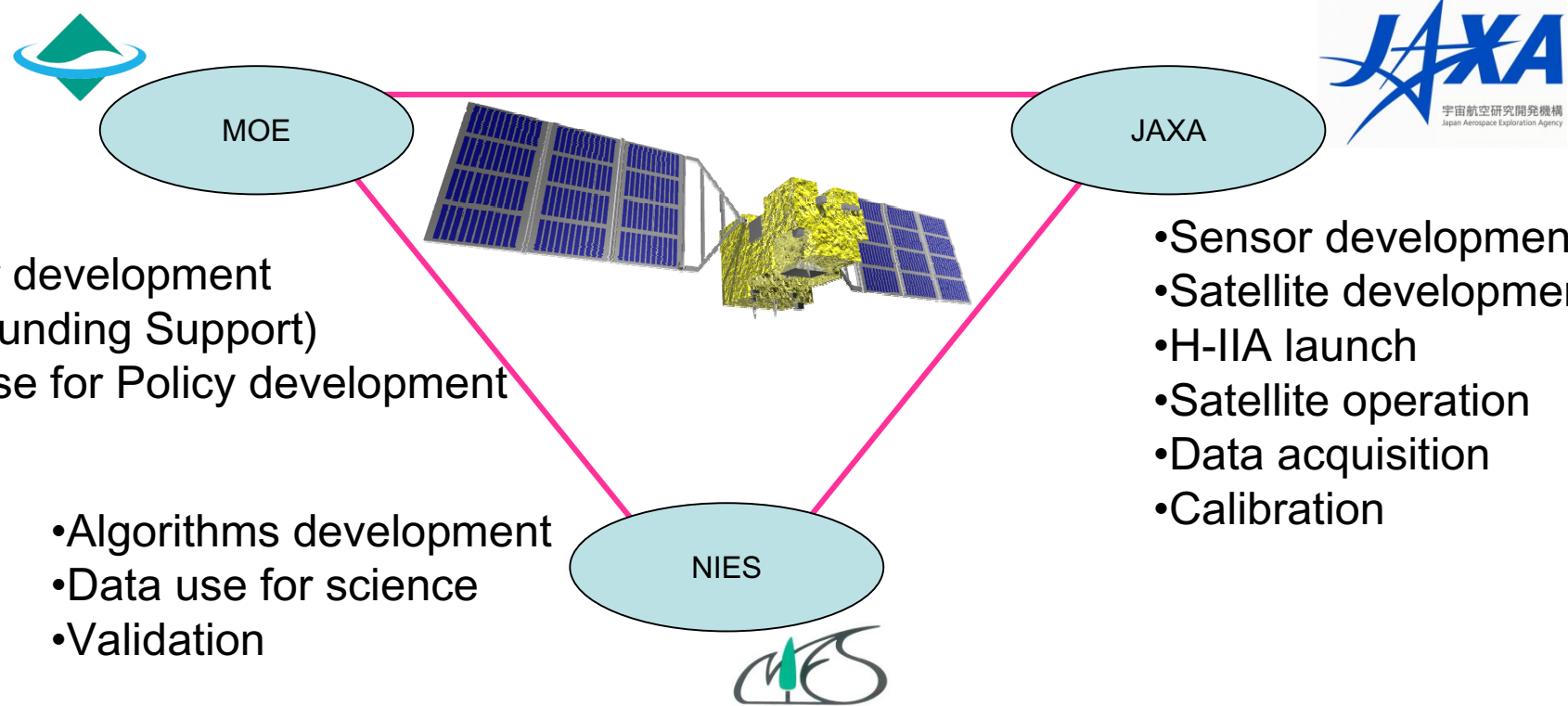


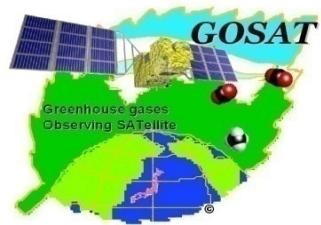
Organization



ORGANIZATION

GOSAT is the joint project of JAXA, MOE (Ministry of Environment) and NIES (National Institute for Environmental Studies).





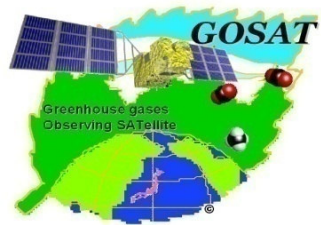
Mission Objectives



GOSAT has two major mission objectives;

- (1) To contribute to the environmental policy development.
 - by monitoring the global distribution of GHG(CO_2 and CH_4)
 - by estimating the emission and absorption of GHG at sub-continental scale.

- (2) To contribute to the advancement of earth observation technologies.
 - by developing Short Wave and Thermal Infrared Fourier Transform Spectrometer
 - by developing highly reliable and robust satellite system



Mission Priority

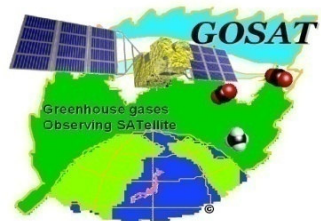


(1) Primary mission

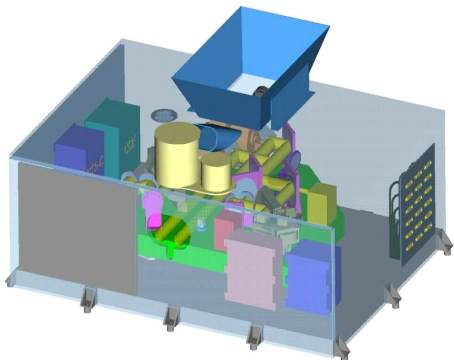
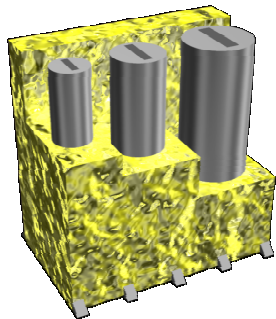
- Short Wave Infrared observation
- CO₂ and CH₄ column density (day time)

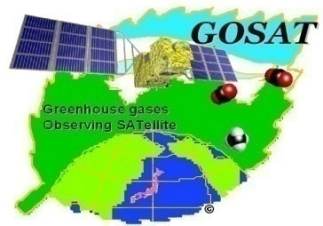
(2) Secondary mission

- Thermal Infrared observation
- CO₂ and CH₄ altitude profile
- CO₂ and CH₄ column density (night time)
- Other gases (O₃, etc)
- Other products (Temperature profile, Earth radiation)



Sensor Characteristics

	Greenhouse Gases Observing Sensor	Clouds and Aerosol Sensor
		
Size	1.2*1.1*0.7m	0.5*0.4*0.5m
Mass	250kg	40kg
Power	310W	100W
FOV	1000km(mechanical scan)	1000km
IFOV	10km	0.5km-1km
Resolution	0.2-0.5(Band1)cm-1	20-130 nm
SNR	300	200
Channel	ch1:0.75-0.78μm/ ch2: 1.56-1.72μm ch3:1.92-2.08μm/ ch4:5.5-14.3μm	ch1:0.38μm/ ch2:0.67μm ch3:0.87μm/ ch4:1.61μm



Operation of FTS



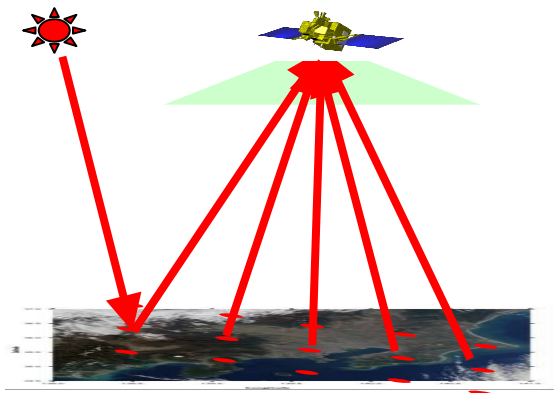
Solar Irradiance Cal.

Lunar Cal

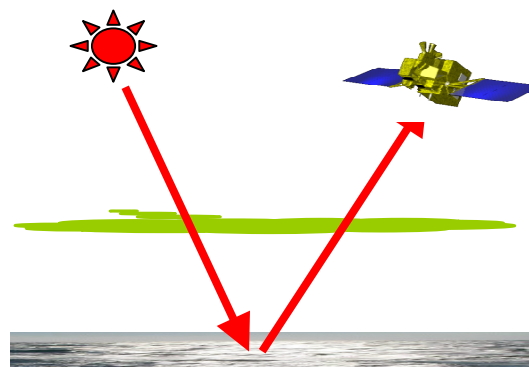
FTS SWIR

Solar Flux

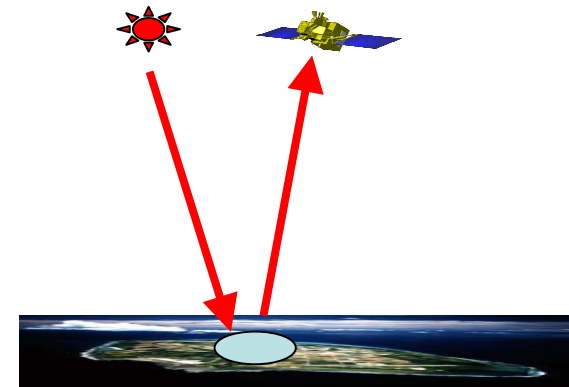
FTS TIR



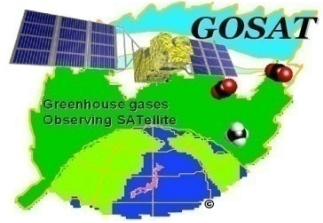
Nominal observation
(dayside land, nightside)



Sunlint observation
(dayside ocean)

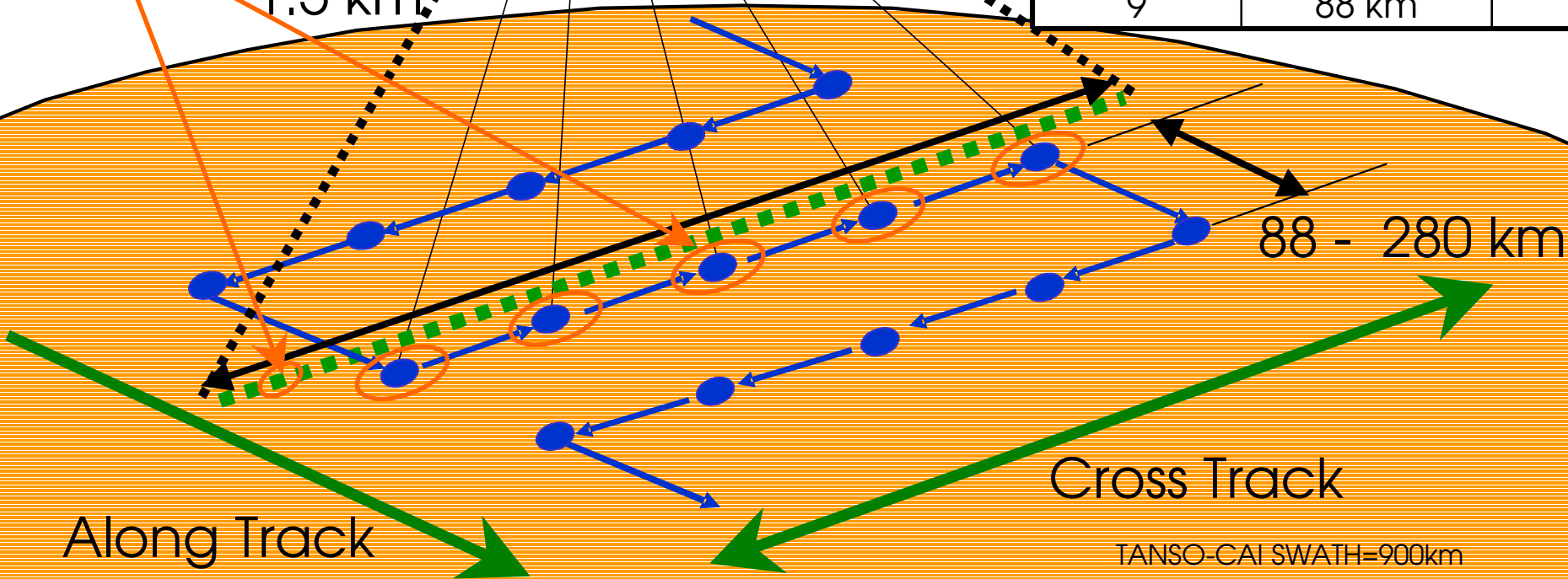


Special point observation
(calibration, validation, pipeline)₁

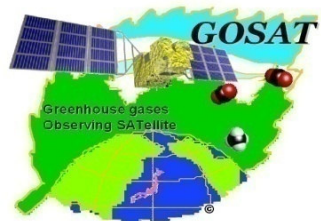


Footprint
 FTS IFOV=10.5 km
 CAI IFOV=0.5,
 1.5 km

Cross-track pattern	Distance bet. points (at 30deg in latitude)	Exposure (sec)
1	790 km	4x3
3	260 km	4x3
5	160 km	4
7	110 km	2
9	88 km	1



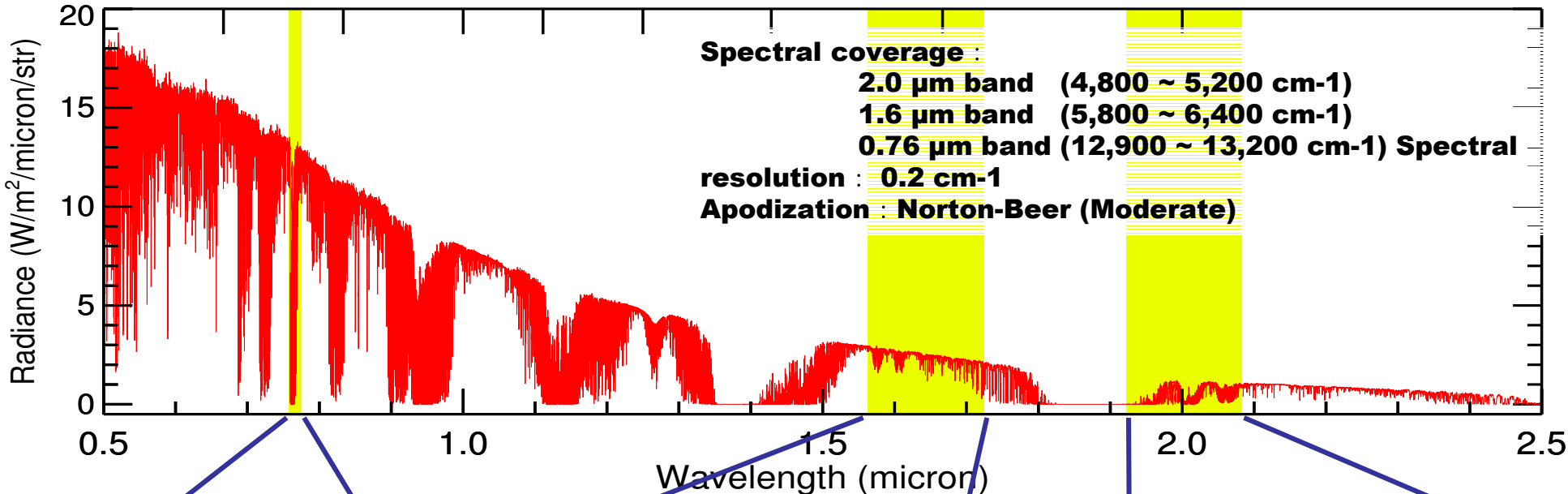
TANSO-CAI SWATH=900km



Near Infrared

Wavenumber (cm^{-1})

20000 15000 12000 10000 8000 7000 6000 5000 4000



Spectral coverage :

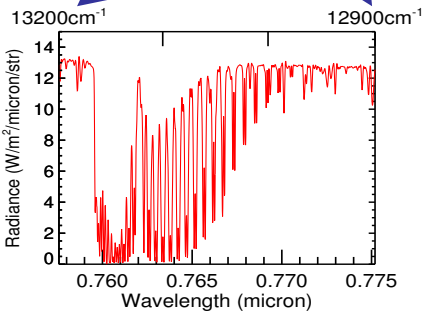
2.0 μm band (4,800 ~ 5,200 cm^{-1})

1.6 μm band (5,800 ~ 6,400 cm^{-1})

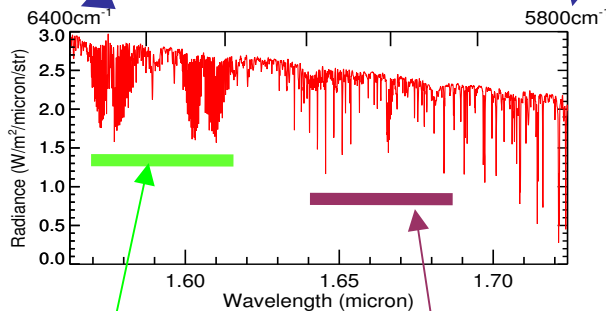
0.76 μm band (12,900 ~ 13,200 cm^{-1}) Spectral

resolution : 0.2 cm^{-1}

Apodization : Norton-Beer (Moderate)

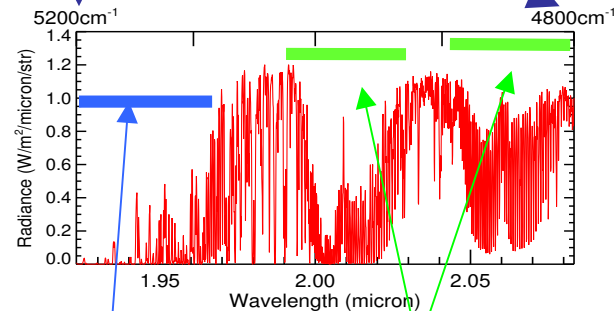


O₂ Band



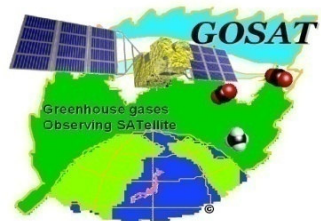
CO₂ Band

CH₄ Band



H₂O Band

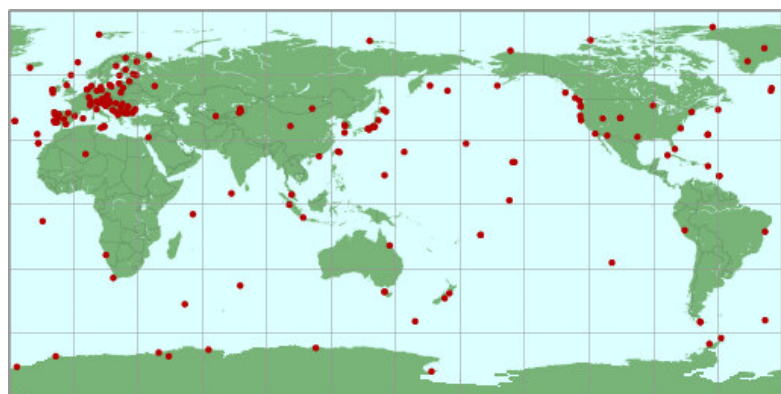
CO₂ Bands



GHG Observing Points



Ground Stations (current)

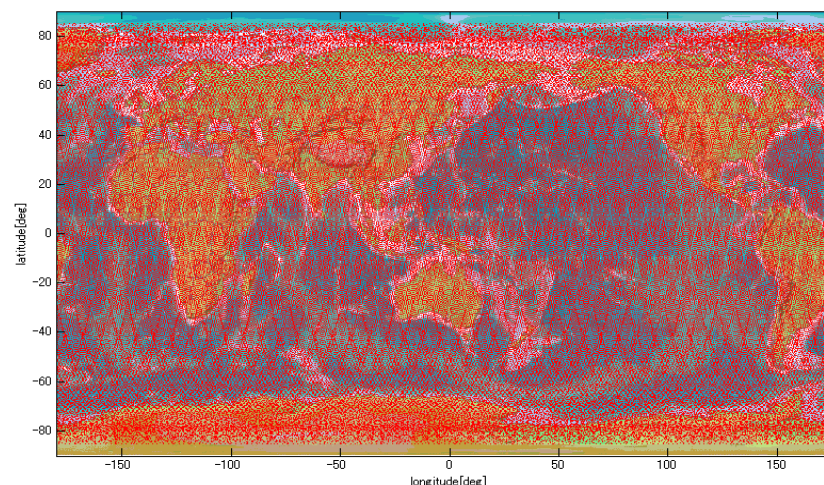


(By WMO WDCGG)

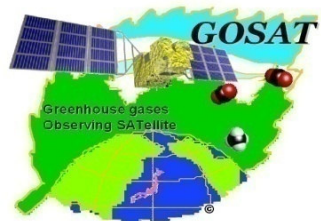
- 274 ground stations in the world.
- The observing data from these stations is distributed from WDCGG of WMO
- The number of stations is limited, and they exist unevenly in the world.

WDCGG: World Data Center for Greenhouse Gases
WMO :World Meteorological Organization

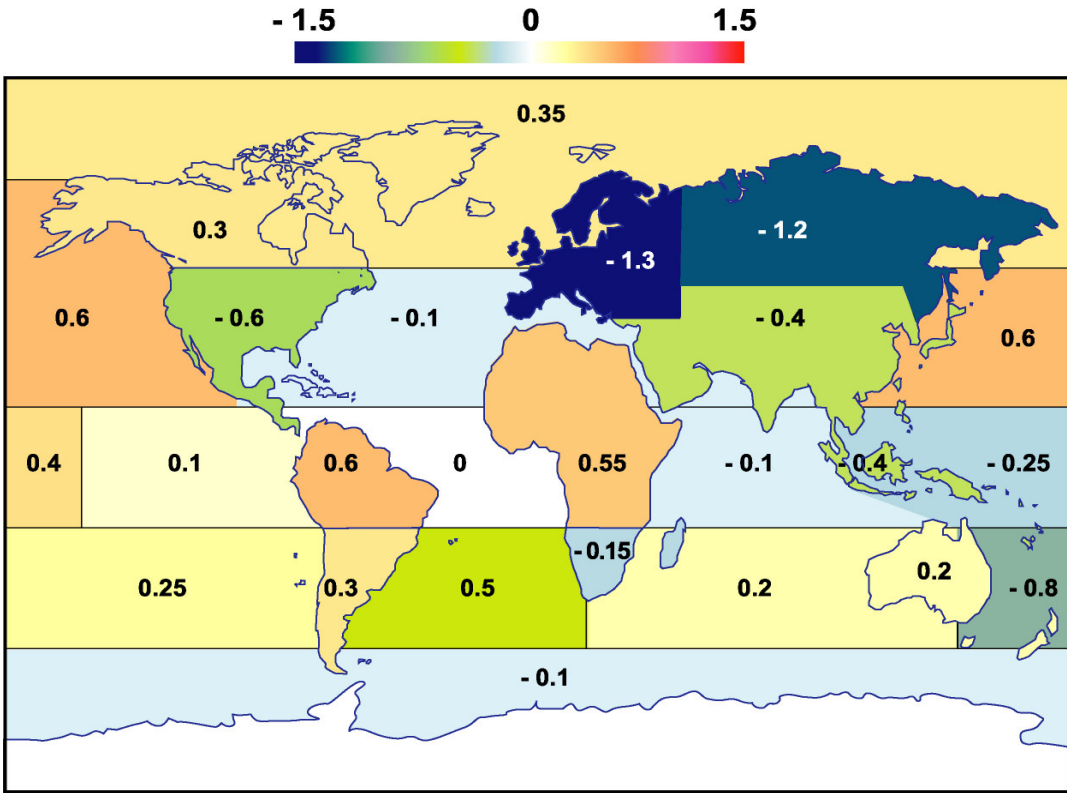
From Space (GOSAT)



- Over 100,000 points per 3 days
- Global and frequent observation with a single instrument

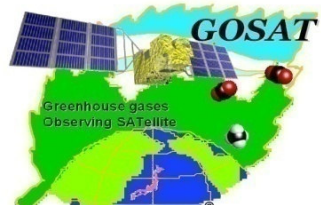


Annual Flux Estimation



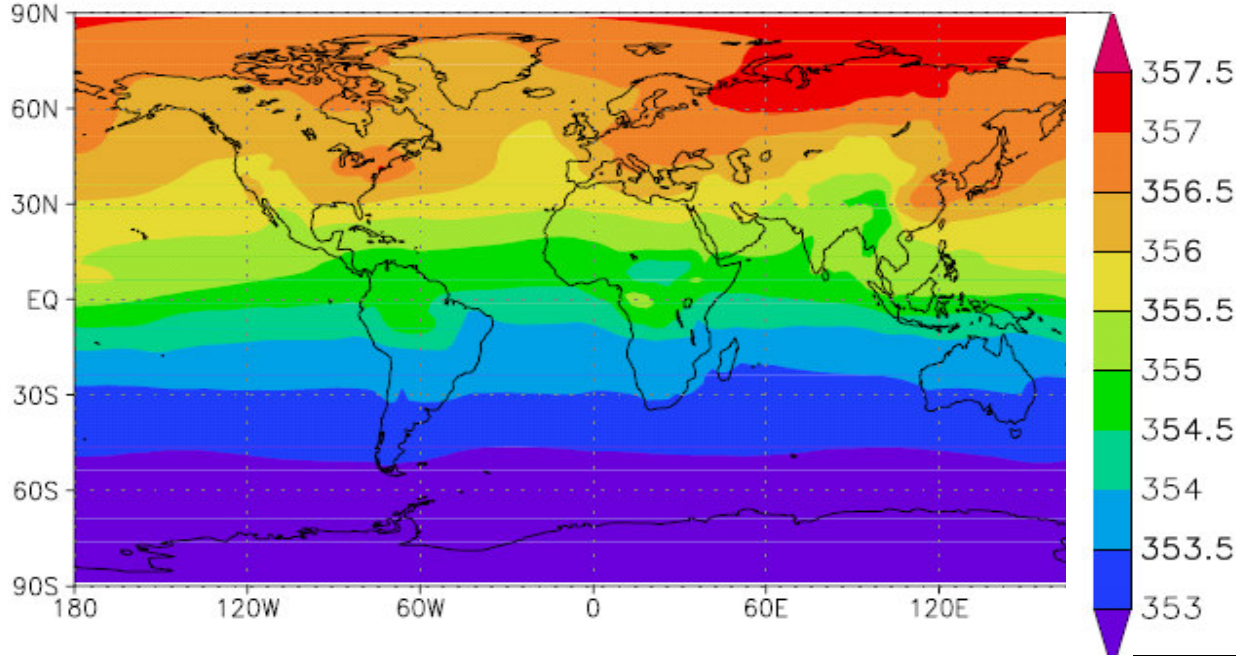
Annual Flux (GtC/yr) of CO₂ in Sub-continent Scale

Current Estimation Error: 0.54GtC/yr

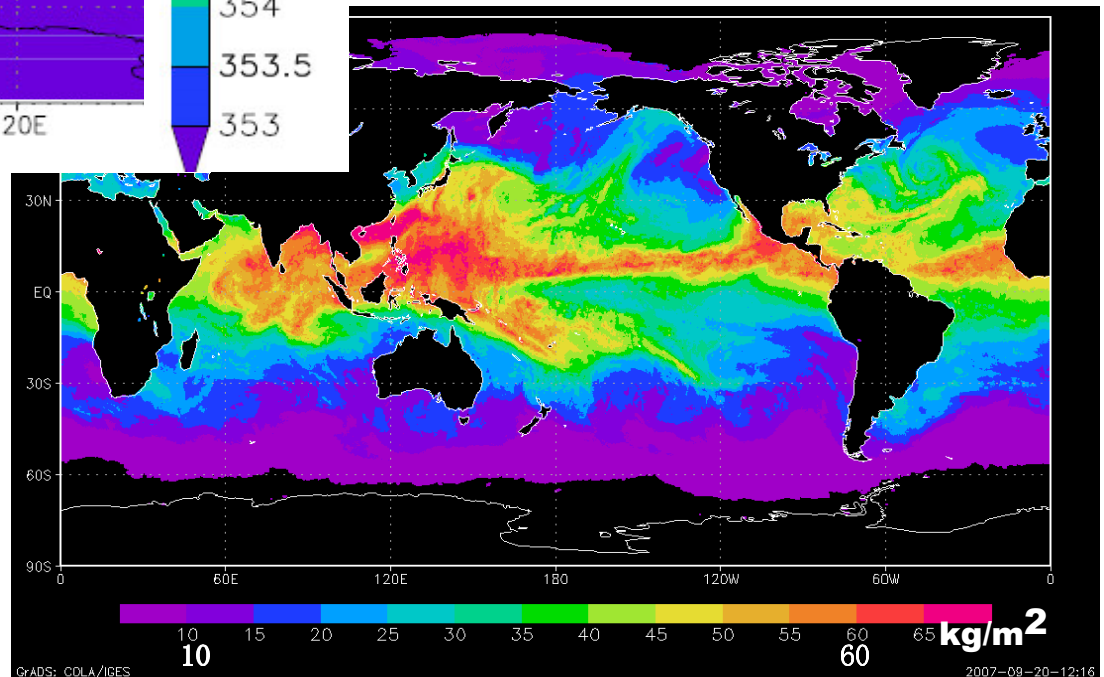


Small longitudinal gradient of CO₂

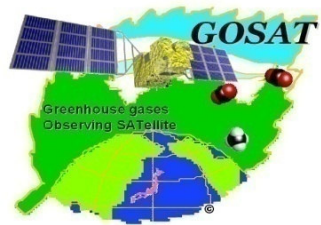
A: Columner CO₂ (in ppm)



**Water column distribution
(Observed by AMSR-E, Aug.-Oct. in 2007)**



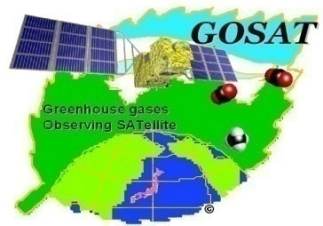
Calculated CO₂ column concentration in March
(the correction is made for the surface altitude)



Conclusion



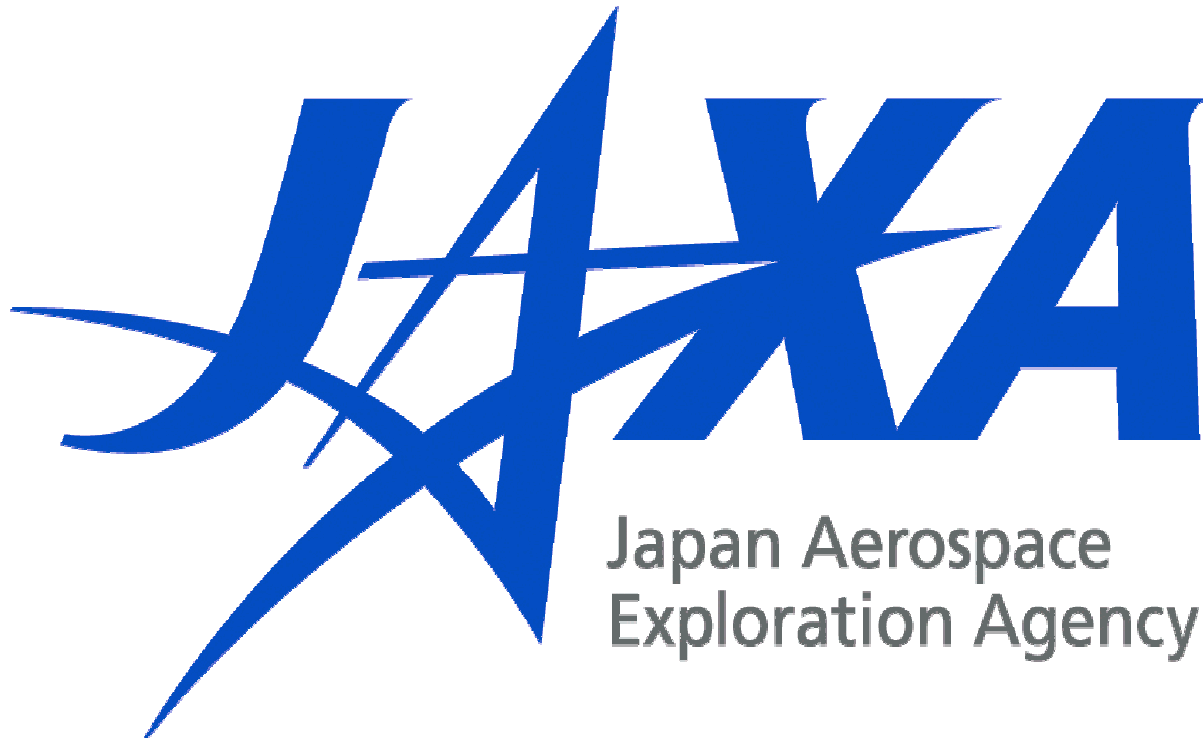
- GOSAT launched on 23rd February by H-IIA
- Mission checkout is underway for 3 months
- CAL/VAL starts April to August
- L1 non validated data provision for PI's starts April
- Another users, L1 from October, L2 from next January
- 2nd RA will be in April



For more secure



and prosperous society



END OF PRESENTA
TION