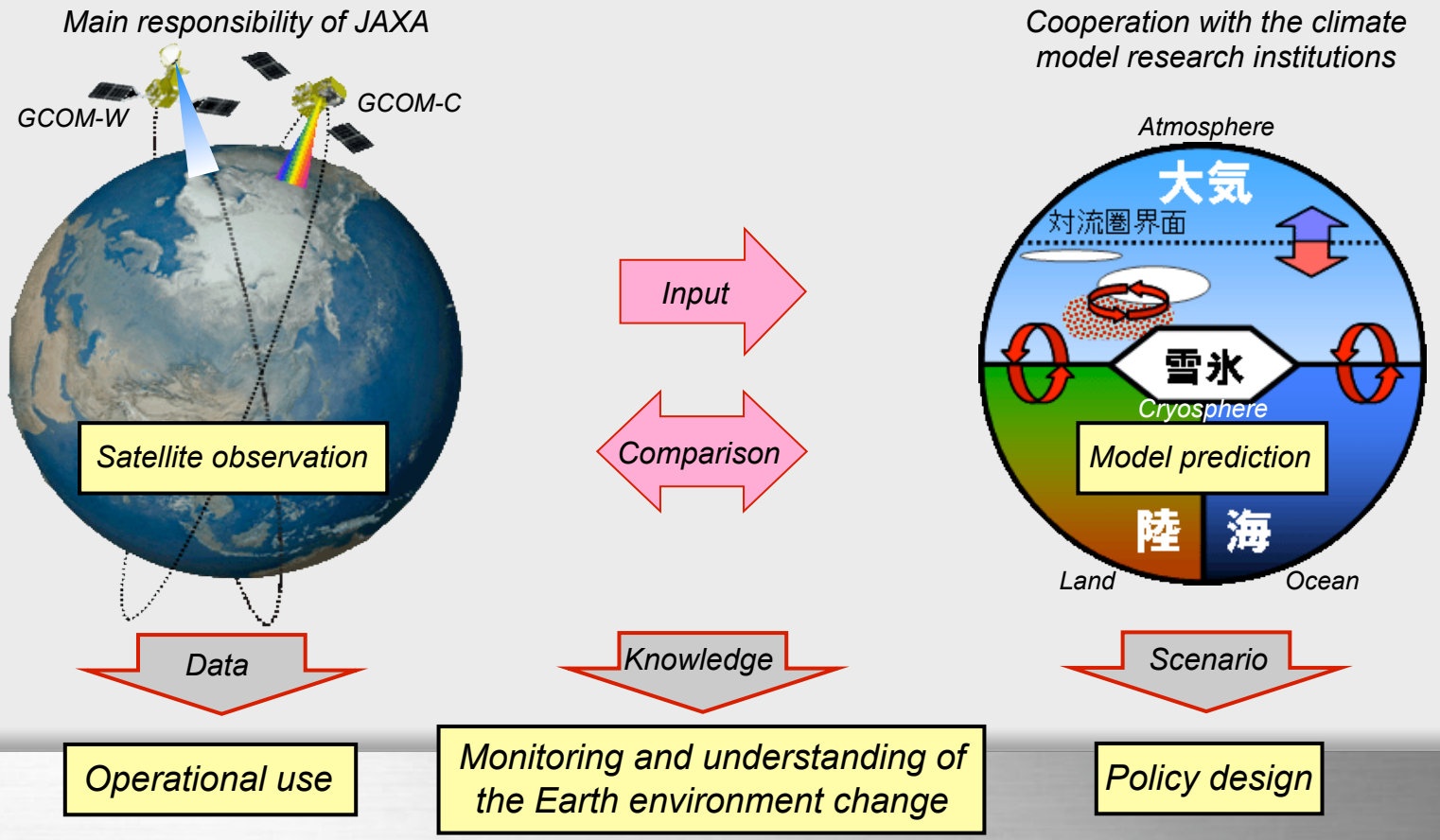
110214_GCOM.ppt

GCOM
- Global Change Observation Mission -

February 2011

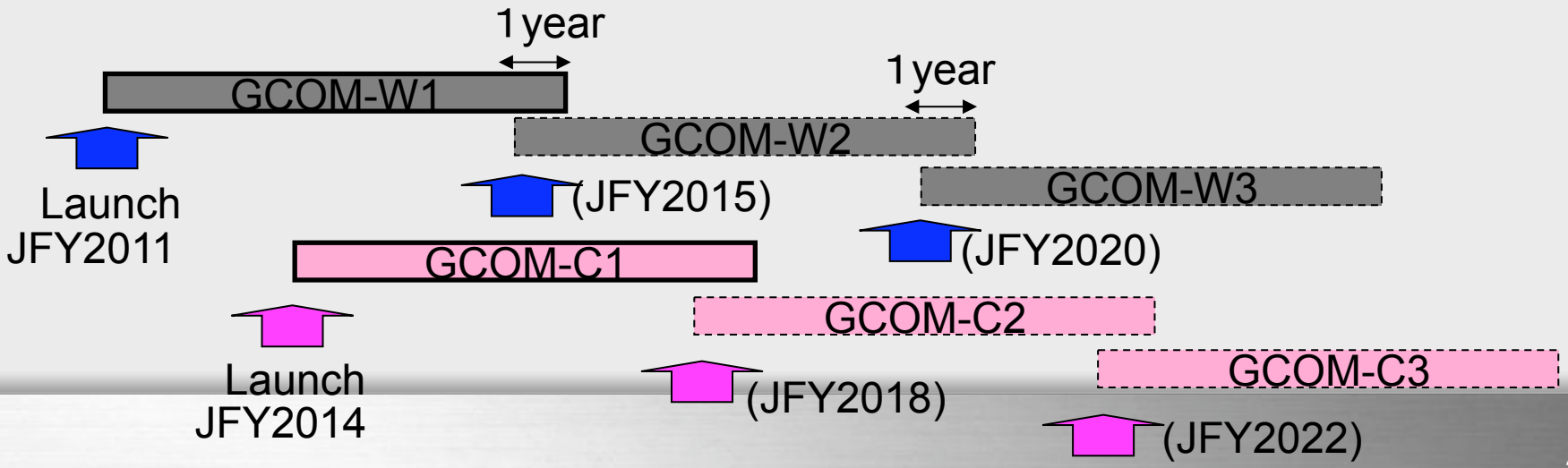
Concept of GCOM

- Demonstrate long-term global observation of various geophysical parameters for understanding climate variability and water cycle.
- Two medium-sized satellites, three generations with one year overlap to ensure 10-15 years stable data records.
- Cooperation with climate models and direct contribution to operational users.

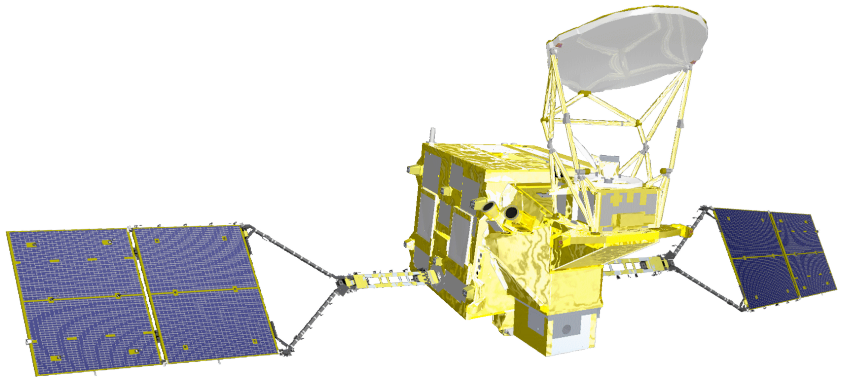


GCOM mission

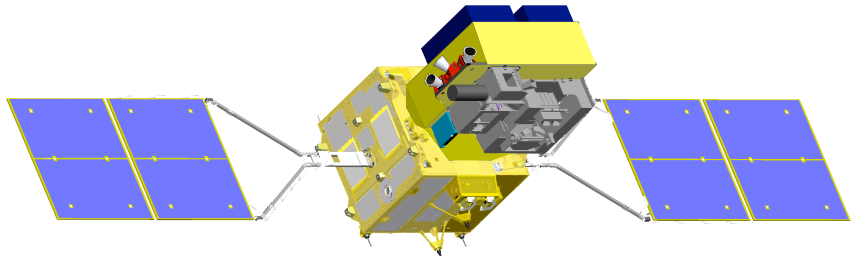
- GCOM consists of GCOM-W and GCOM-C series
  - GCOM-W with AMSR2 (Advanced Microwave Scanning Radiometer2) and its follow-on will contribute to the observations related to global water and energy circulation.
  - GCOM-C with SGLI (Second-generation Global Imager) and its follow-on will contribute to the surface and atmospheric measurements related to the carbon cycle and radiation budget.
- GCOM is long-term mission to observe more than 10 years.
  - Three consecutive generations of satellites with one year overlap in orbit enables over 13 years observation in total.



GCOM 1st Generation Satellites



GCOM-W1 (Water)

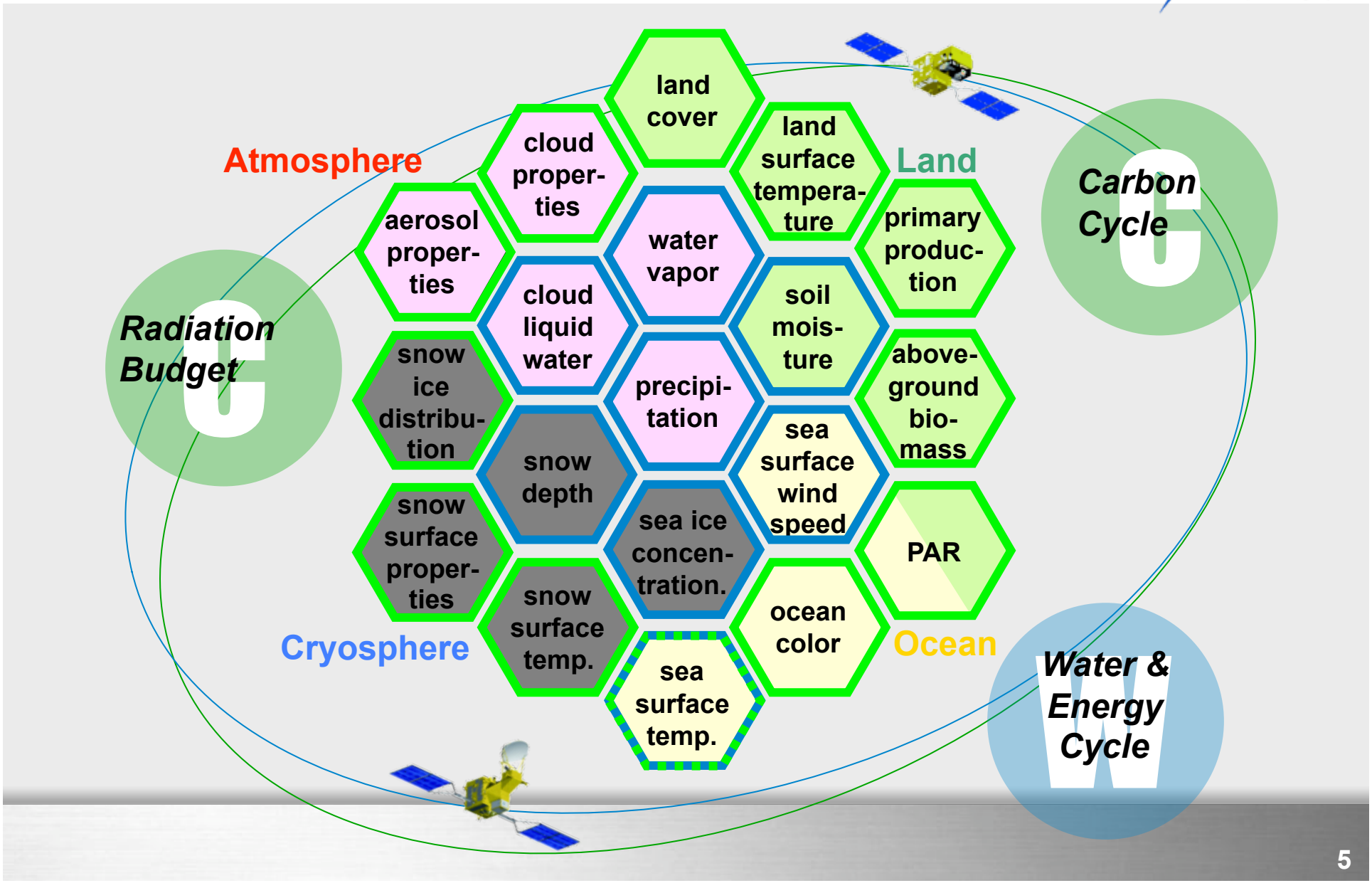


GCOM-C1 (Climate)

Instrument	**Advanced Microwave Scanning Radiometer-2**
Orbit	Sun Synchronous orbit Altitude : 699.6km (on Equator) Inclination: 98.2 degrees Local sun time: 13:30+/-15 min
Size	5.1m (X) * 17.5m (Y) * 3.4m (Z) (on-orbit)
Mass	1991kg
Power gen.	More than 3880W (EOL)
Launch	JFY 2011 by H-IIA Rocket
Design Life	5-years

Instrument	**Second-generation Global Imager**
Orbit	Sun Synchronous orbit Altitude : 798km (on Equator) Inclination: 98.6 deg. Local sun time: 10:30+/- 15min
Size	4.6m (X) * 16.3m (Y) * 2.8m (Z) (on orbit)
Mass	2093kg
Power gen.	More than 4000W (EOL)
Launch	JFY 2014 by H-IIA Rocket
Design Life	5-years

Geophysical Parameters



AMSR2 Instrument


AMSR2

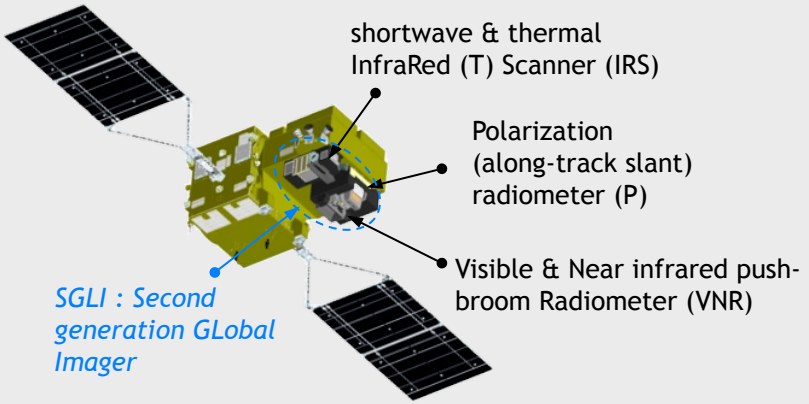

AMSR-E

- Deployable main reflector system with 2.0m diameter.
- Frequency channel set is identical to that of AMSR-E except 7.3GHz channel for helping RFI mitigation.
- Two-point external calibration with the improved HTS (hot-load).
- Deep space calibration maneuver to check consistency between main reflector and CSM.
- Add a redundant momentum wheel to increase reliability.

GCOM-W1/AMSR2 characteristics	
Scan and rate	Conical scan at 40 rpm
Antenna	Offset parabola with 2.0m dia.
Swath width	1450km
Incidence angle	Nominal 55 degrees
Digitization	12bits
Dynamic range	2.7-340K
Polarization	Vertical and horizontal

AMSR2 Channel Set				
Center Freq. [GHz]	Band width [MHz]	Pol.	Beam width [deg] (Ground res. [km])	Sampling interval [km]
6.925/ 7.3	350	V and H	1.8 (35 x 62)	10
10.65	100		1.2 (24 x 42)	
18.7	200		0.65 (14 x 22)	
23.8	400		0.75 (15 x 26)	
36.5	1000		0.35 (7 x 12)	
89.0	3000		0.15 (3 x 5)	5

SGLI Instrument

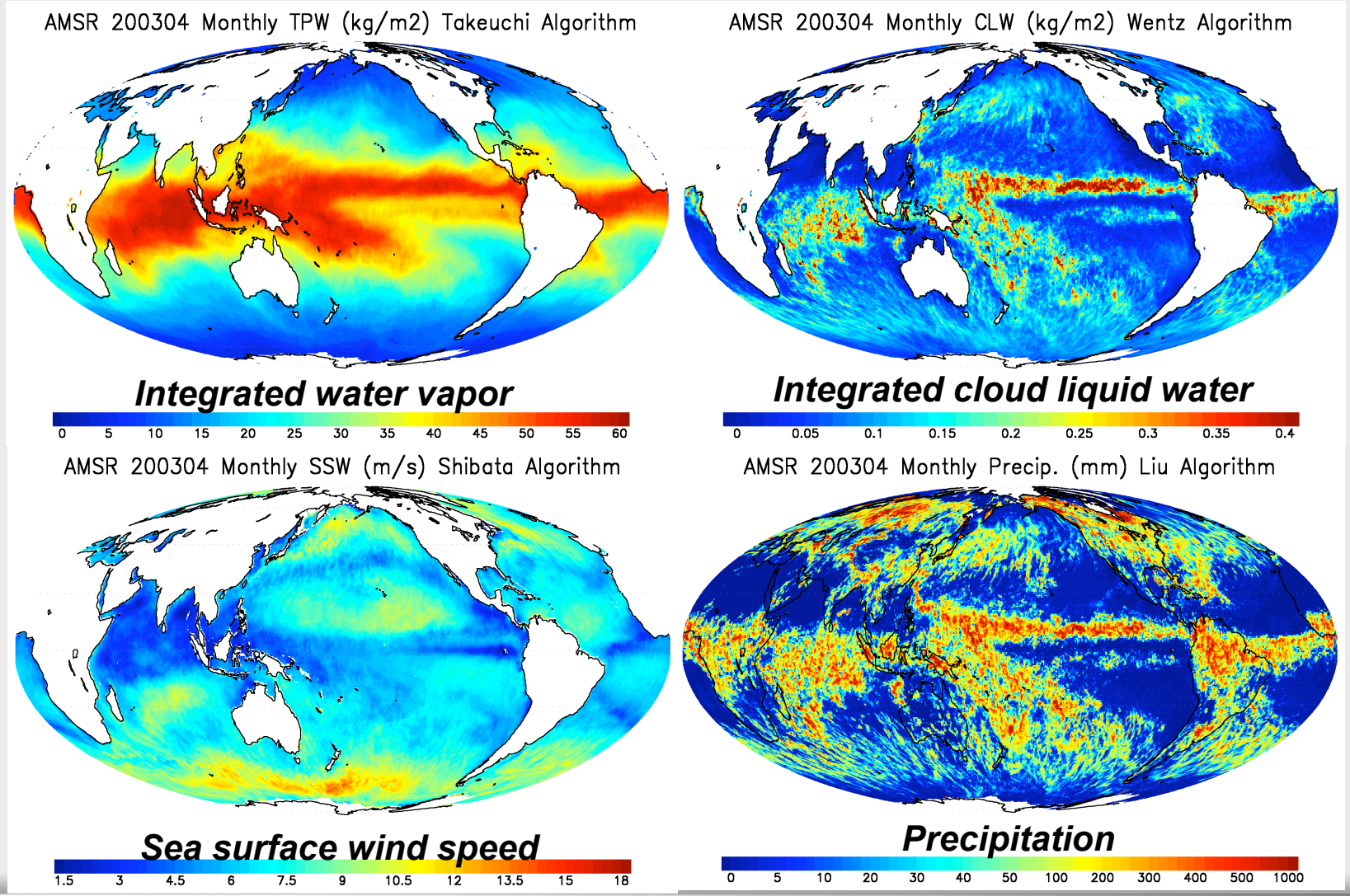


GCOM-C SGLI characteristics	
Scan	Push-broom electric scan (VNR: VN & P) Wisk-broom mechanical scan (IRS: SW & T)
Scan width	1150km cross track (VNR: VN & P) 1400km cross track (IRS: SW & T)
Digitalization	12bit
Polarization	3 polarization angles for P
Along track direction	Nadir for VN, SW and T, +45 deg and -45 deg for P
On-board calibration	VN: Solar diffuser, Internal lamp (PD), Lunar by pitch maneuvers, and dark current by masked pixels and nighttime obs. SW: Solar diffuser, Internal lamp, Lunar, and dark current by deep space window T: Black body and dark current by deep space window All: Electric calibration

SGLI channels					
CH	λ	$\Delta\lambda$	L_{std}	L_{max}	IFOV
	nm		VN, P: $W/m^2/sr/\mu m$ T: Kelvin		m
VN1	380	10	60	210	250
VN2	412	10	75	250	250
VN3	443	10	64	400	250
VN4	490	10	53	120	250
VN5	530	20	41	350	250
VN6	565	20	33	90	250
VN7	673.5	20	23	62	250
VN8	673.5	20	25	210	250
VN9	763	12	40	350	1000
VN10	868.5	20	8	30	250
VN11	868.5	20	30	300	250
SW1	1050	20	57	248	1000
SW2	1380	20	8	103	1000
SW3	1630	200	3	50	250
SW4	2210	50	1.9	20	1000
T1	10800	740	300	340	500
T2	12000	740	300	340	500
P1	673.5	20	25	250	1000
P2	868.5	20	30	300	1000

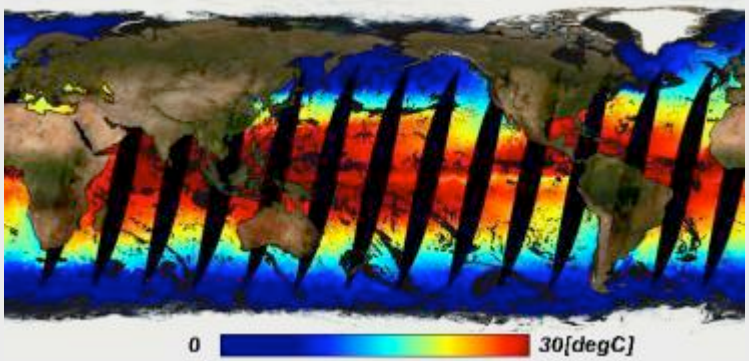
Expected GCOM-W Products

Examples of AMSR Monthly Global Map

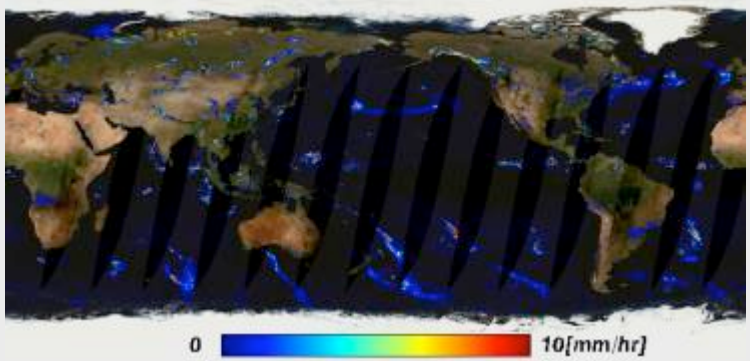


Expected GCOM-W Products

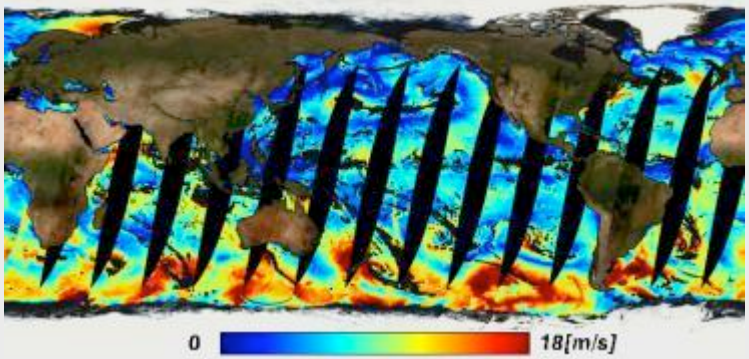
Examples of AMSR-E Daily Snapshots



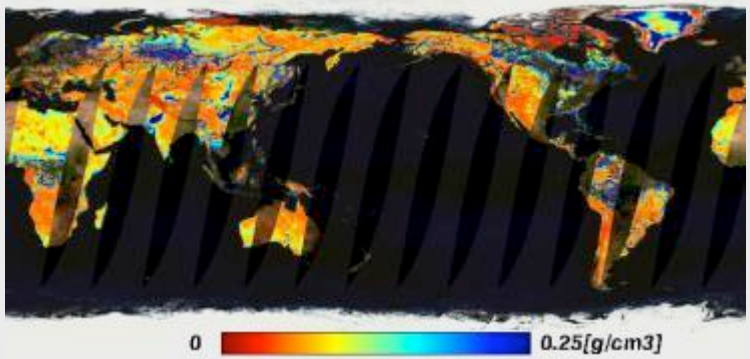
Sea Surface Temperature



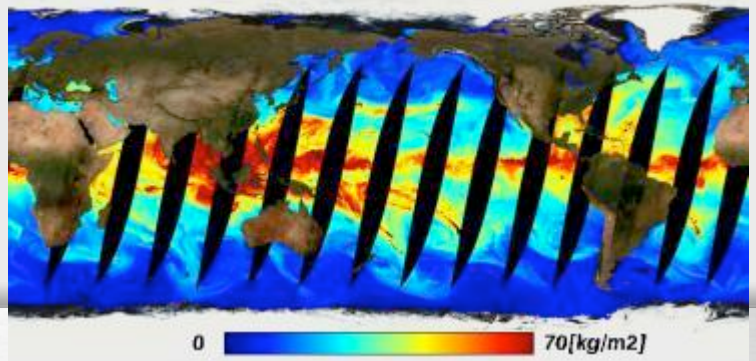
Precipitation



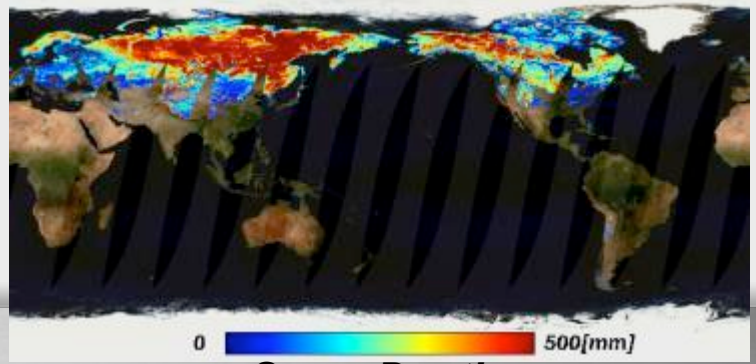
Sea Surface Wind Speed



Soil Moisture Content



Total Precipitable Water

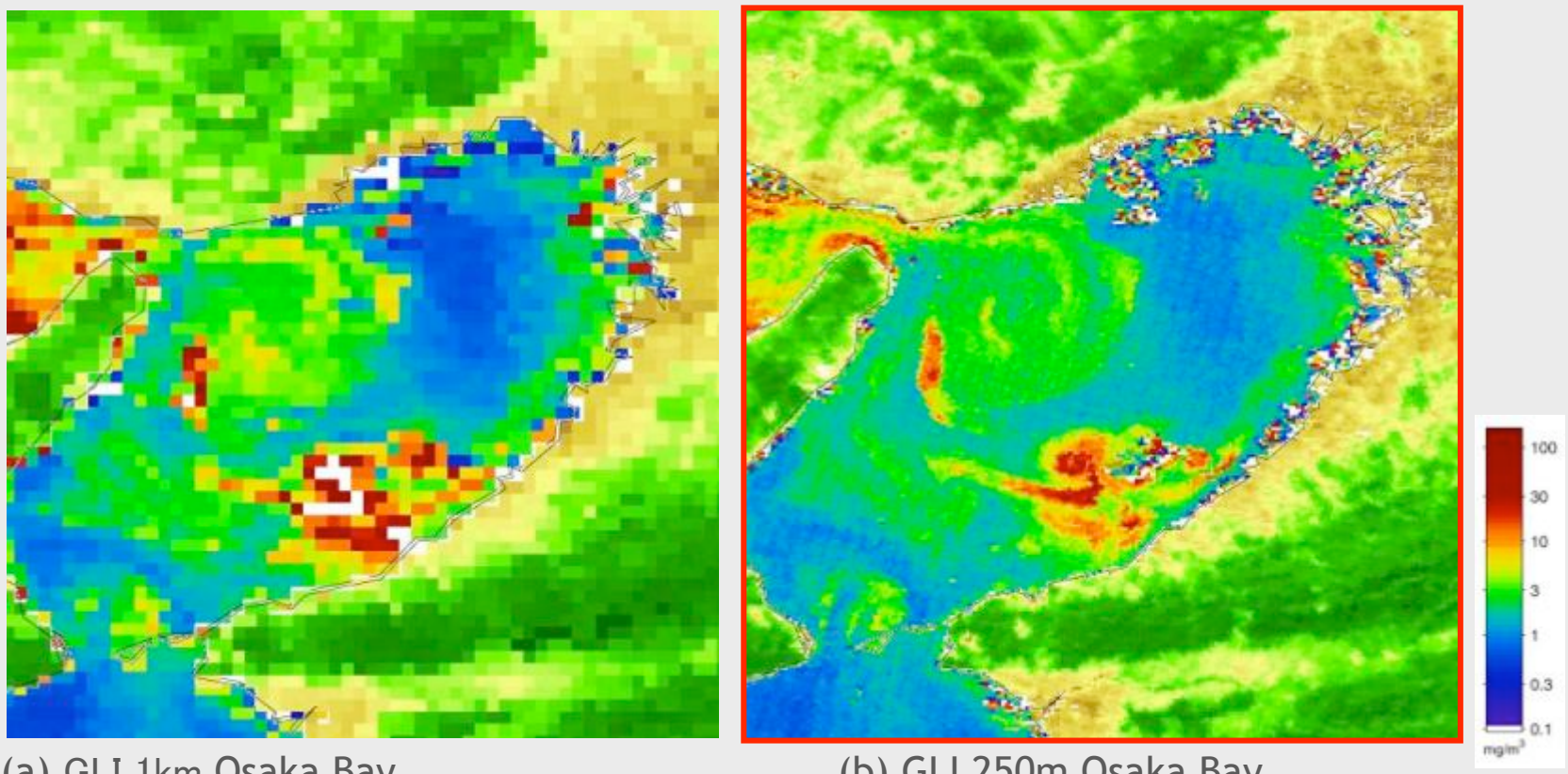


Snow Depth

Expected GCOM-C Products

Simulation of VNR 250m land and coastal observation

250m Ocean color chlorophyll-a and NDVI simulated using GLI 250m channels



(a) GLI 1km Osaka Bay
(1 Oct. 2003, CHL by LCI)

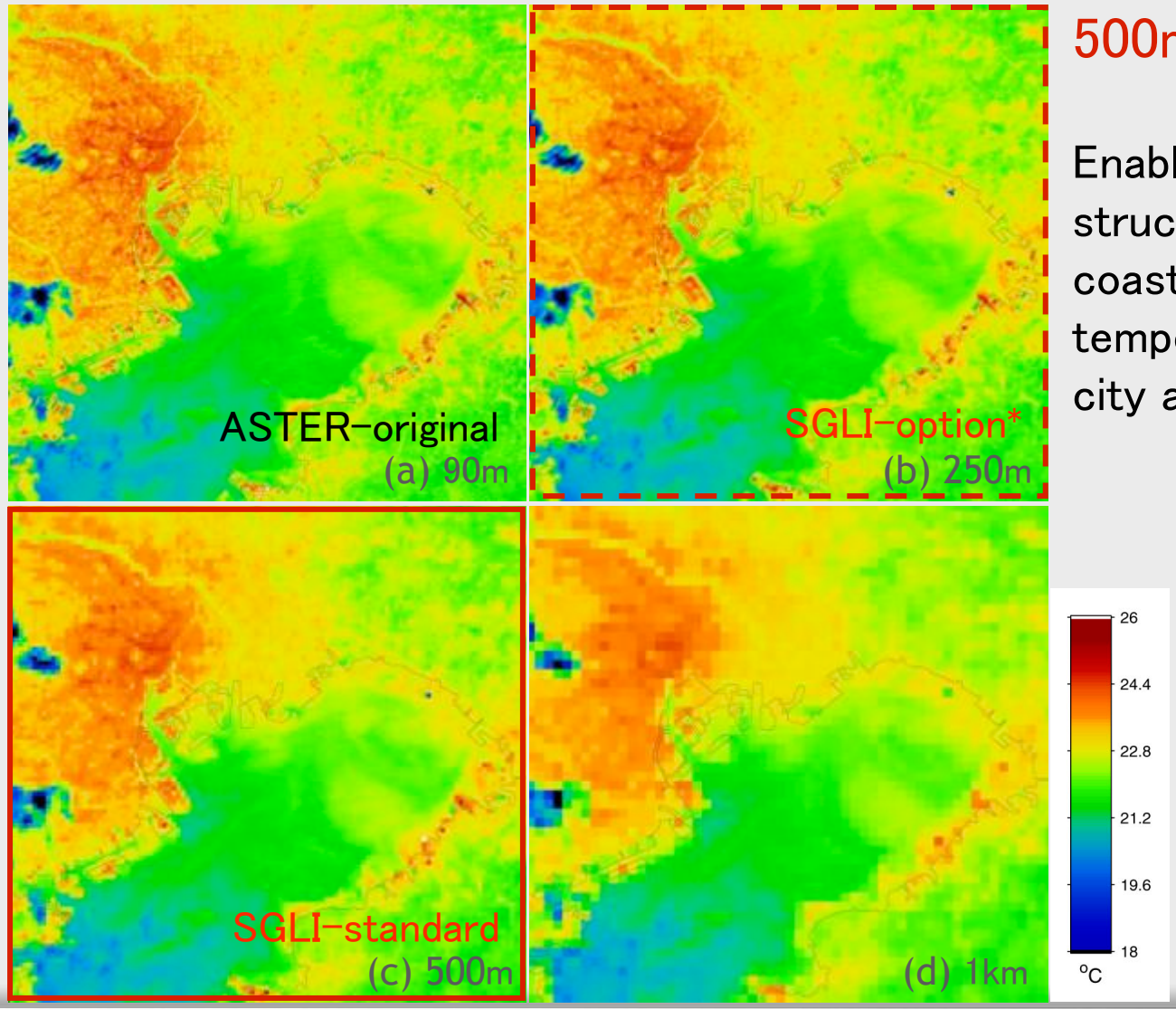
(b) GLI 250m Osaka Bay
(1 Oct. 2003, CHL by LCI)

SGLI 250m resolution will enable to detect more fine structure in the coastal area such as river outflow, regional blooms, and small current.

Hiroshi Murakami, Mitsuhiro Toratani and Hajime Fukushima, **Satellite ocean color observation with 250 m spatial resolution using ADEOS-II GLI**, Remote Sensing of the Marine Environment, Proceedings of SPIE, Volume 6406-05, Nov. 28, 2006

Expected GCOM-C Products

Simulation of TIR 500m land and coastal observation



500m resolution of TIR

↓

Enables detection of fine structures such as land and coastal water surface temperature influenced by the city and the river flows.

* SGLI has TIR observation with 250m spatial resolution as a optional capability.

Simulated thermal infrared images using ASTER data over Tokyo Bay in the night on August 4, 2003.

GCOM-W1 under testing at TKSC