



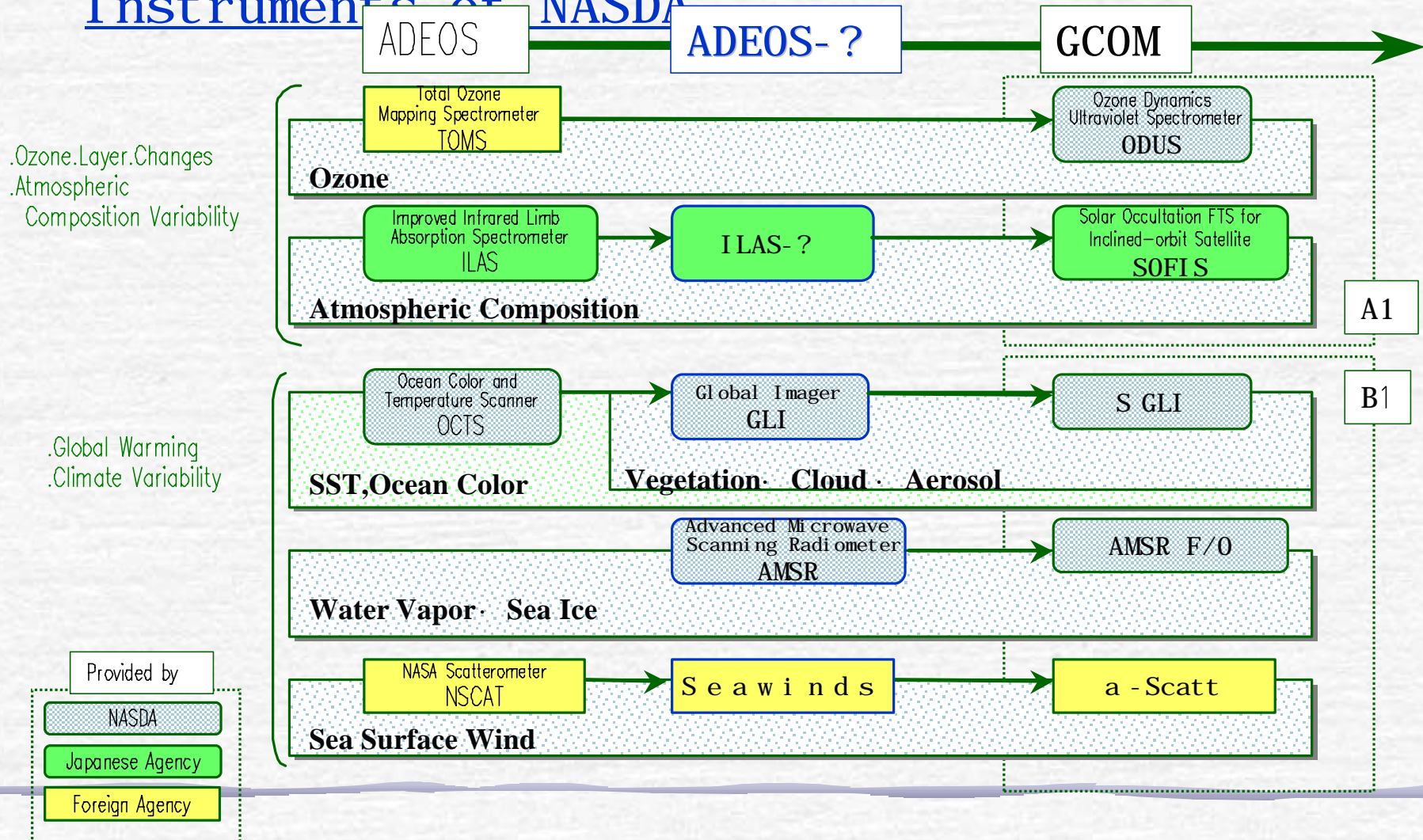
**Global Change Observation Mission (GCOM)
SGLI (Second-generation GLI)**

**Office of Satellite Technology,
Research and Applications
NASDA**

GCOM Mission Concept **(Science Requirements)**

- **Continuity and advancement of observation from ADEOS-II**
 - A Higher priority will be placed on the continuity of observation of geophysical parameters rather than on the continuity of the instruments
 - 15 year long-term observation starting with ADEOS-II
- **Contribution to research on global warming, climate variability and ozone variability**
 - Observation of energy cycles and material cycles (water and carbon)
 - Continued monitoring of the stratospheric ozone, particularly of the polar regions
 - Observation of the tropospheric ozone and the related chemical processes
- **Response to COP3 (Kyoto Protocol)**

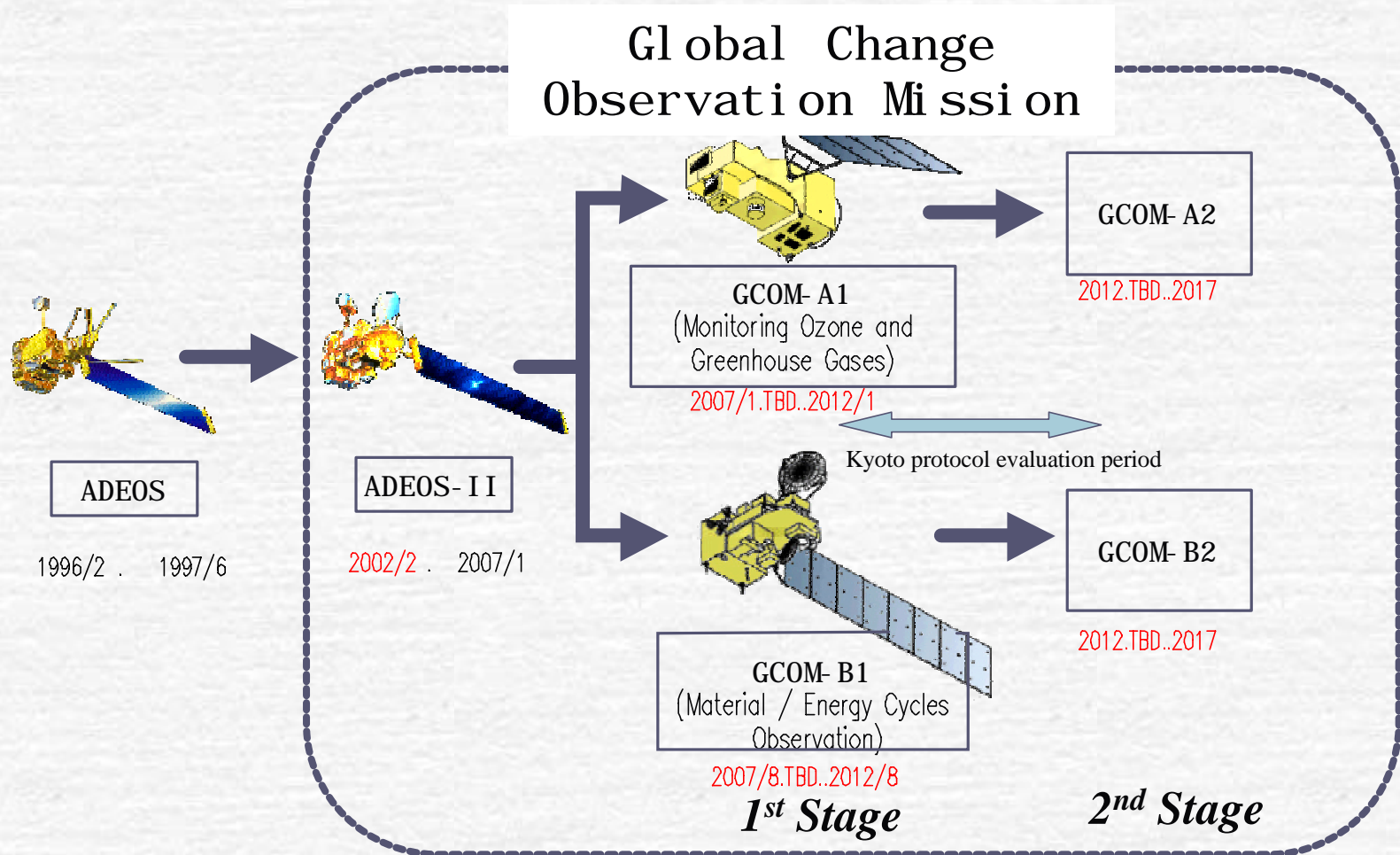
Continuity of Physical Parameters and Instruments of NASDA



GCOM status

- Finished JFY2000 conceptual study of satellite, sensor (ODUS and SGLI) and ground segment.
- Finished some component prototyping of ODUS and numerical structure model analysis to review mass requirement
- Ongoing algorithm development of ODUS
- SWIFT was selected as a payload for GCOM-A1 by GCOM-A1 science / evaluation board on November 2000
- 1st GCOM-A1 workshop was held in Tokyo August 2nd, 2001
- 1st GCOM-A1 Inter agency Working Group was held in Tokyo on August 3rd, 2001 with CSA, the Ministry of Environment, NIES and EMS-T
- Held the GCOM-A1 evaluation board to conduct the feasibility of phasing up GCOM-A1 led by Prof. Asai
- 2nd GCOM-A1 IWG will be held in ESTEC following to SWIFT phase A study review meeting
- In JFY2002, NASDA will continue to do phase A study of GCOM-A1 bus, ODUS system & SGLI system, ODUS algorithm development and GCOM-A1 ground segment

GCOM Satellite Series





Major Characteristics

Item	GCOM-A1	GCOM-B1
Orbit	Non-Sunsynchronous	Sunsynchronous
Type	650km	800km
Altitude	70deg.	98deg.
Inclination	98minutes	101minutes
Period	----	AM 10:00±15(TBD)
Local Sun Time		
Launch Payload	1200kg	2200kg
Instruments Weight	315kg	770kg
Designed Life	≥3years	
Propellant	for 5years	
Communication/C&DH		
(1)Telemetry/Command	USB(DRTS Compatible)	USB(DRTS Compatible)
(2)Instruments Data(Science Data)	8GHz band: 60Mbps	8GHz band: 2×60Mbps
Electrical Power(EPS)		
(1)Bus Voltage	28V unregulated bus	28V unregulated bus
(2)Battery	NiCd 50AH×3	NiCd 50AH×4
(3)Solar Cell Paddle	Rigid Paddle	Rigid Paddle
(4)Power(EOL)	1800W	3200W
Attitude & Orbit Control(AOCS)		
(1)Attitude Control	3 Axis Zero-momentum	
(2)Sensor	GPS receiver , Star Tracker , Earth Sensor etc.	



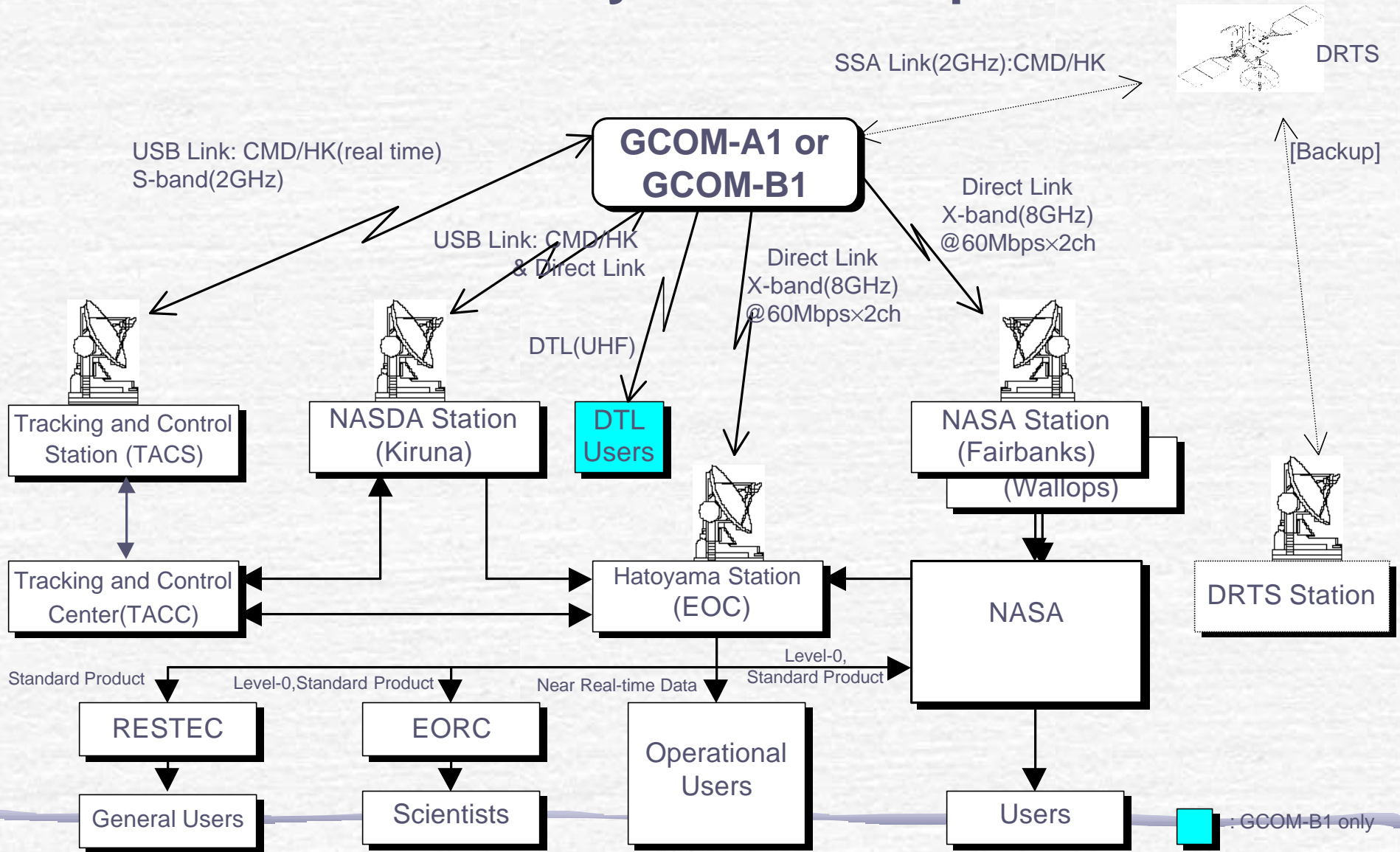
NASDA

GCOM A1/B1 Instruments

GCOM- A1	ODUS	S O F I S	SWIFT
	Ozone Dynamics Ultraviolet Spectrometer	Solar Occultation FTS for Inclined orbit Satellite	Stratospheric Wind Interferometer for Transport studies
Wave Length (Frequency)	306-420nm.228Ch.	3-13.m 753-784.m	8-9.m
IFOV	18km	1km.(Vertical)	2km
Swath Width Weight Allocation	2300km 55kg	- 200kg	71kg
Physical Parameters	Ozone , Aerosol SO2, NO2, Albedo , UV-B	Atmospheric Composition	Stratosphere wind and ozone observation
Provider	NASDA	Ministry of the Environment	ESA

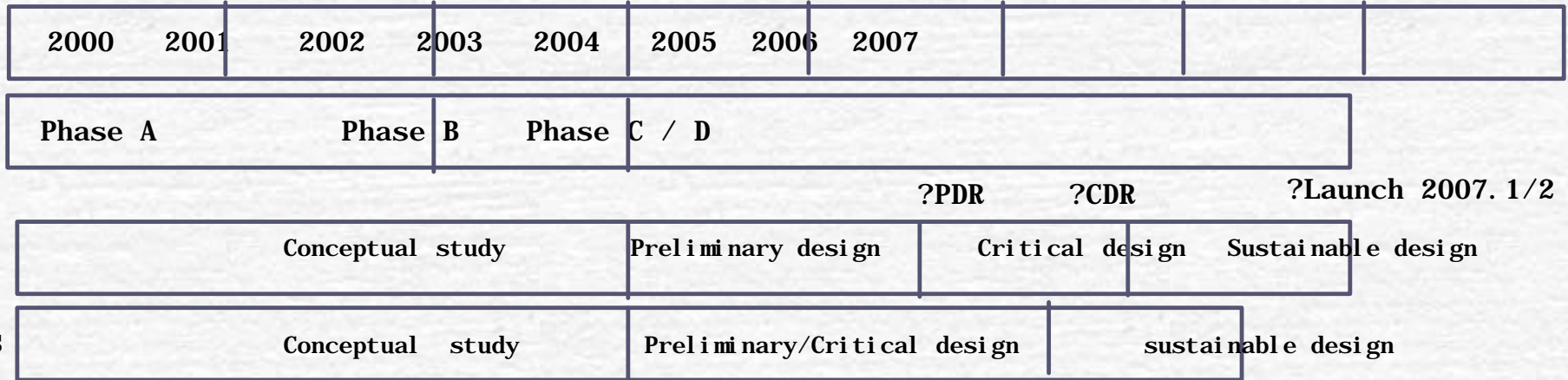
GCOM- B1	S G L I	A M S R F / O	A l p h a S C A T	T B D
	Second generation Global Imager	Advanced Microwave Scanning Radiometer Follow on		
Wave Length (Frequency)	380nm - 12.0.m 36Ch.	6.295GHz, 10.65GHz 18.7GHz, 23.8GHz 36.5GHz, 50.3GHz 52.8GHz, 89.0GHz	13.4GHz	
IFOV	250m,1km,	7-50km	20km	
Swath Width	1600km	1600km	1600km	
Weight Allocation	350kg	250kg	160kg	
Physical Parameters	SST,Ocean Color Vegetation,Cloud,Aerosol	Water Vapor , Precipitation Snow and Ice , Soil Moisture Sea Surface Wind , SST	Wind Vectors	
Provider	NASDA	NASDA	JPL	

GCOM System Concept

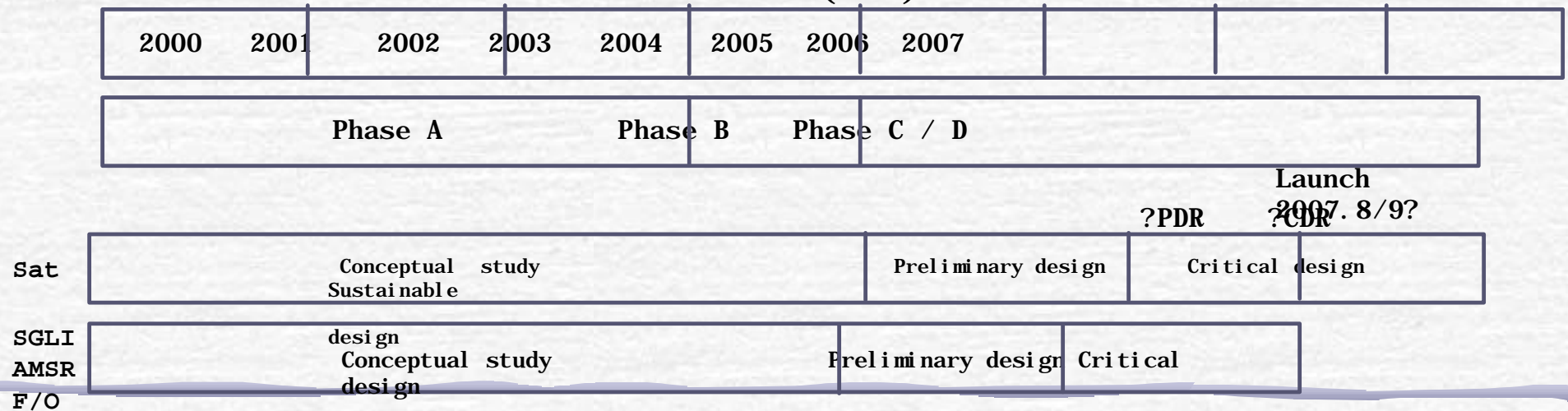


?GCOM-A1/B1 development schedule (tentative plan)

GCOM-A1 Schedule (JFY)



GCOM-B1 Schedule (JFY)

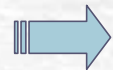




GCOM 1st Generation Spacecrafts

GCOM-A1

.NASDA/EM/ESA.

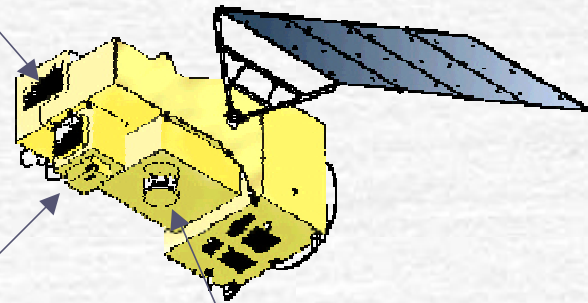


Monitor of Ozone and GHG

- Monitoring ozone layer depletion
- Monitoring greenhouse gases
- Monitoring air quality
- Monitoring stratosphere wind

Weight : 1.2 ton
 Altitude : 650km
 Inclination Orbit : 70deg
 (Inclination 70 deg)

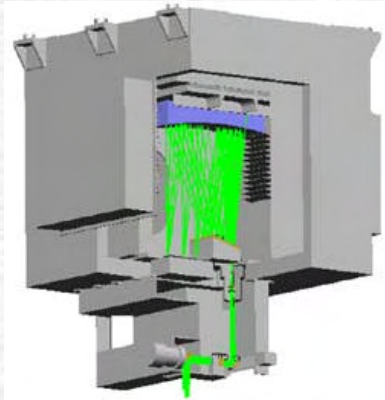
SWIFT (ESA)
 Stratosphere wind
 measurement etc.



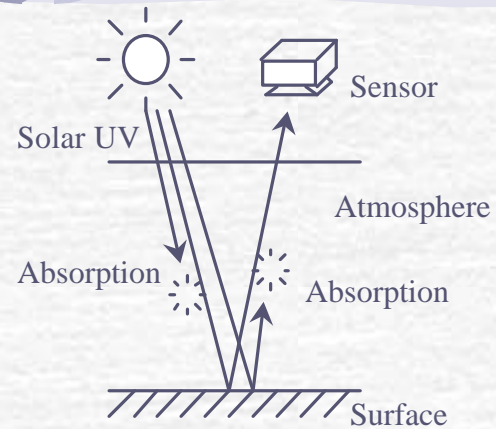
ODUS (NASDA)
 Ozone
 Aerosol
 Observation of sulfur dioxide

SOFIS (EM)
 Observation such
 as greenhouse
 gases, aerosol

ODUS (Ozone Dynamic Ultraviolet Sensor)



a. ODUS Sensor Outlook



b. Observation Concept

C. Draft Specification of ODUS

System	Sensor
Development Agency : NASDA	Method : Grating Polychrometer, Fastie-Ebert
Weight: 50kg	Wavelength range : 306- 420nm
Power: 70W	Wavelength sampling step: 0. 5nm
Data rate: 100kbps	Band number: 228
Lifetime: More than 3 years	FOV : 1. 6deg(along- track) 120deg(cross- track)
	IFOV : 1. 6°×1. 6°
	S/N : 40 @ 306nm?100 @ >310nm
	Science objective : global mapping of the total ozone
	: global mapping of the cloud top height and aerosol
	: Volcanic SO2
	: SO2 and NO2

SOFIS (Solar Occultation FTS for Inclined Orbit Satellite)

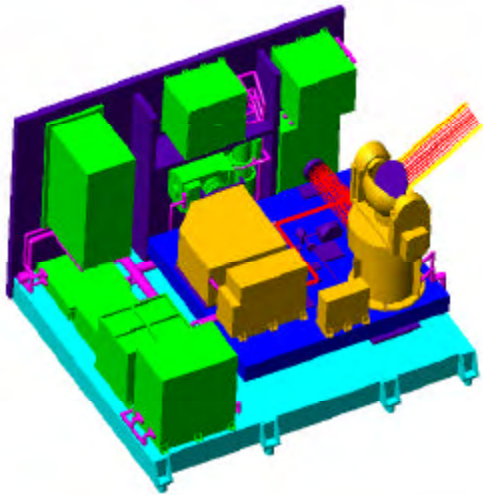
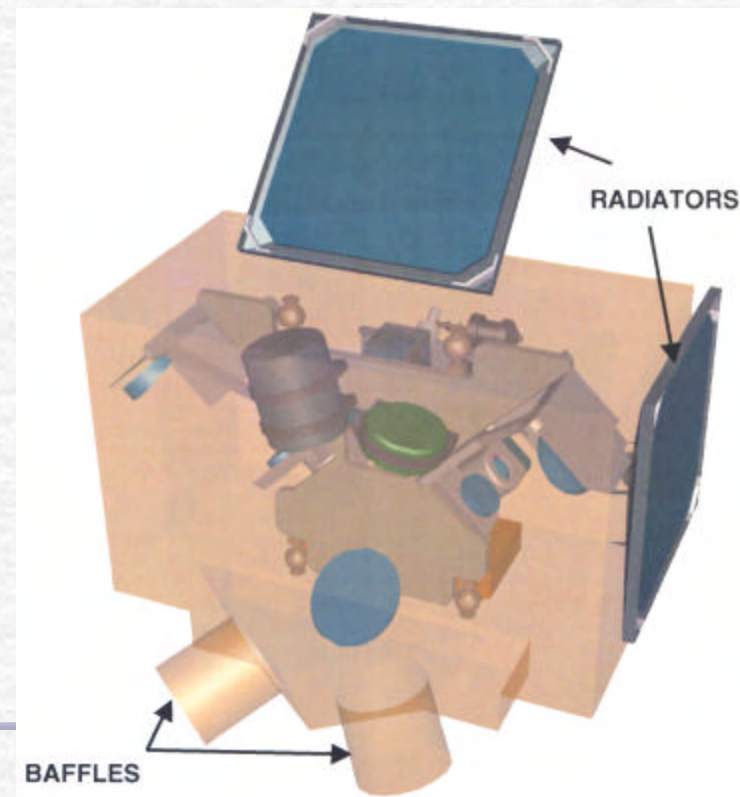


Table 1-2 SOFIS Specification (plan)

System	Sensor	
Development Agency : FA	Method	Solar Occultation FTS
Mass 1000 kg	Wave Len	3-13 μm
Power 100 W		753-784 nm
Data rate 100 Mb/s	Resol	Channel 1000 cm ⁻¹
Life time : More than 3 years		Channel 0.5 cm
	Vertical observation range	100 km
	Vertical resolution	1 km
	IFOV	0.1°
	Solar tracking accuracy	< 0.1°
	Solar tracking response time	< 10 s
	Solar tracking angle response time	< 0.1°
		Channel 1000 cm ⁻¹
		Channel 0.5 cm
	Detector	Channel 1 Fov type - q tb, s...
		Channel 2 : One dimensional Silicon photo diode array
	Science Object	Aerosol, Atmospheric density, temperature
		H2O, CH4, NO2, N2O, O3, CO2, HNO3, CFC-11, CFC-12, CLONO2, (HCl)

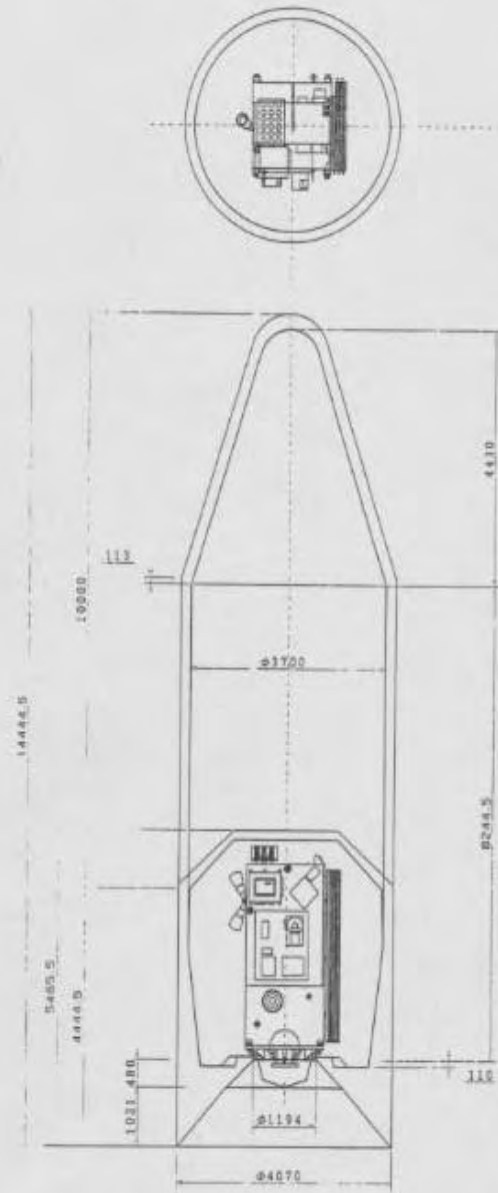
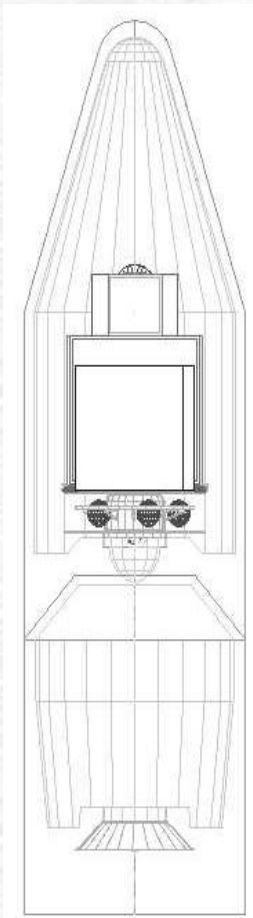
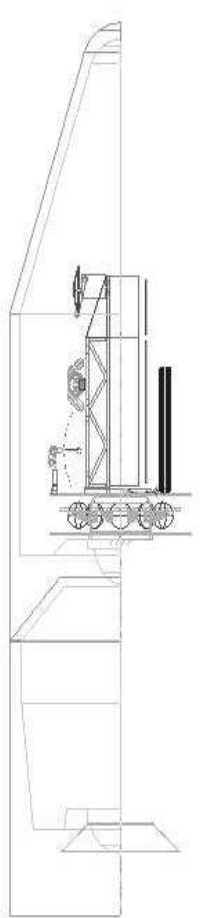
SWIFT (Stratospheric Wind Interferometer for Transport studies)

Observation Accuracy	
..Wind	. 5m/s @ 20km–40km
..Ozone distribution	. <= 5%
IFOV	.2km
Wavelength	.8–9.μm
Mass	.71kg (TBD)
Power	.85W (TBD)
Data Rate	.105kbps



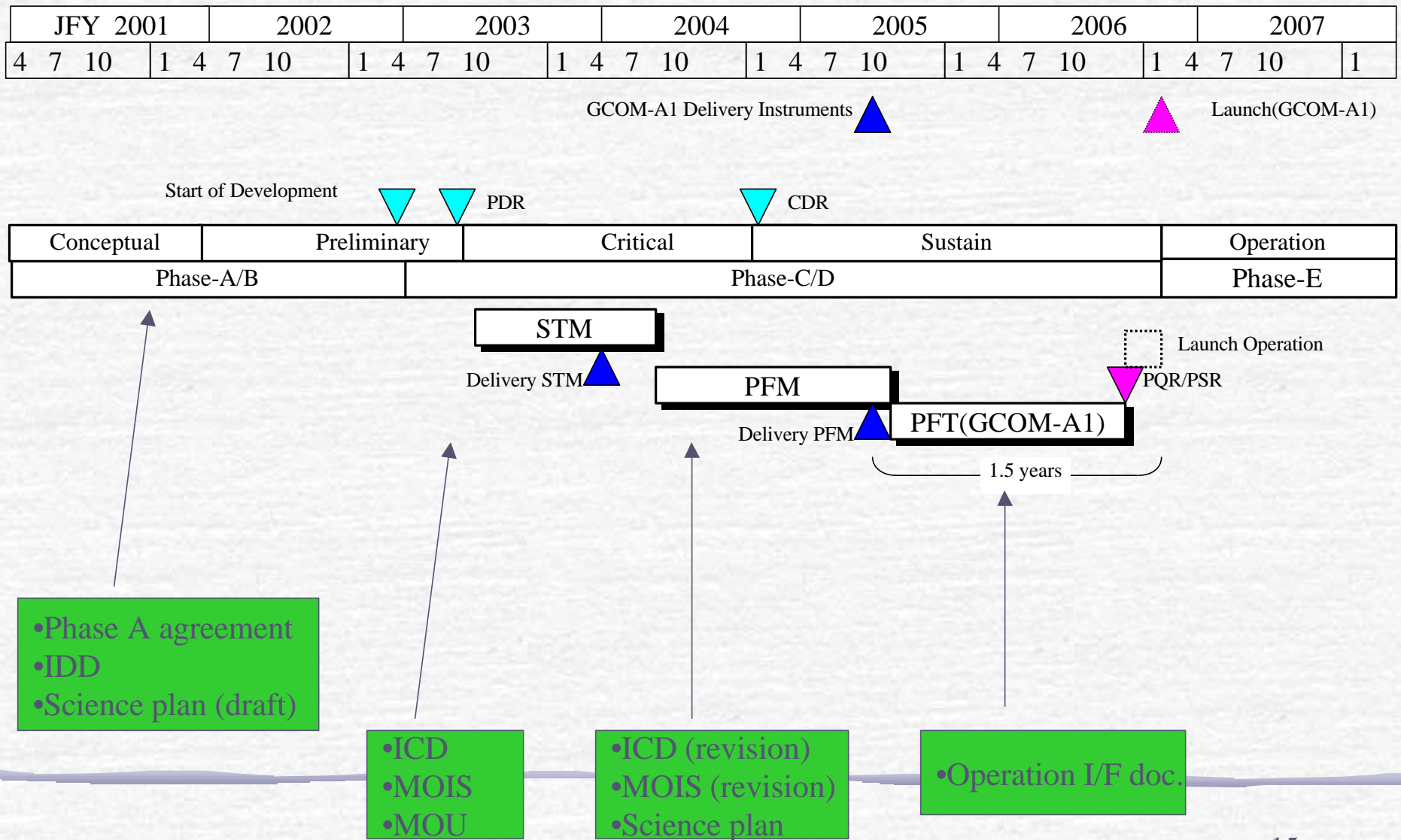
H2-A Dual launch Configuration

H-IIA 4D-LC



GPM Core.H-IIA upper.....GCOM-A1.H-IIA lower.

Master Schedule



GCOM 1st Generation Spacecrafts

GCOM-B1

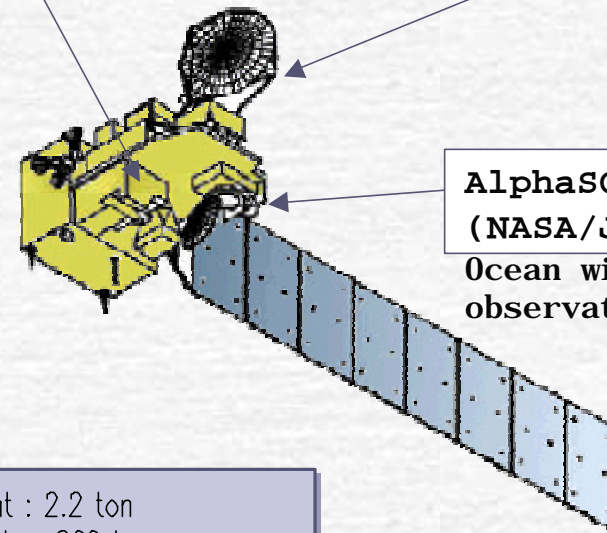
.NASDA/NASA.

➔ Contributing to climate change prediction

- Air / sea interactions
(water, heat, momentum)
- Radiative forcing of cloud / aerosol
- CO₂ circulation by the forest / ocean plankton

SGLI (NASDA)
Observation such as ocean color / sea surface temperature, vegetation

AMSR F/O (NASDA)
Observation such as water vapor, cloud water, precipitation



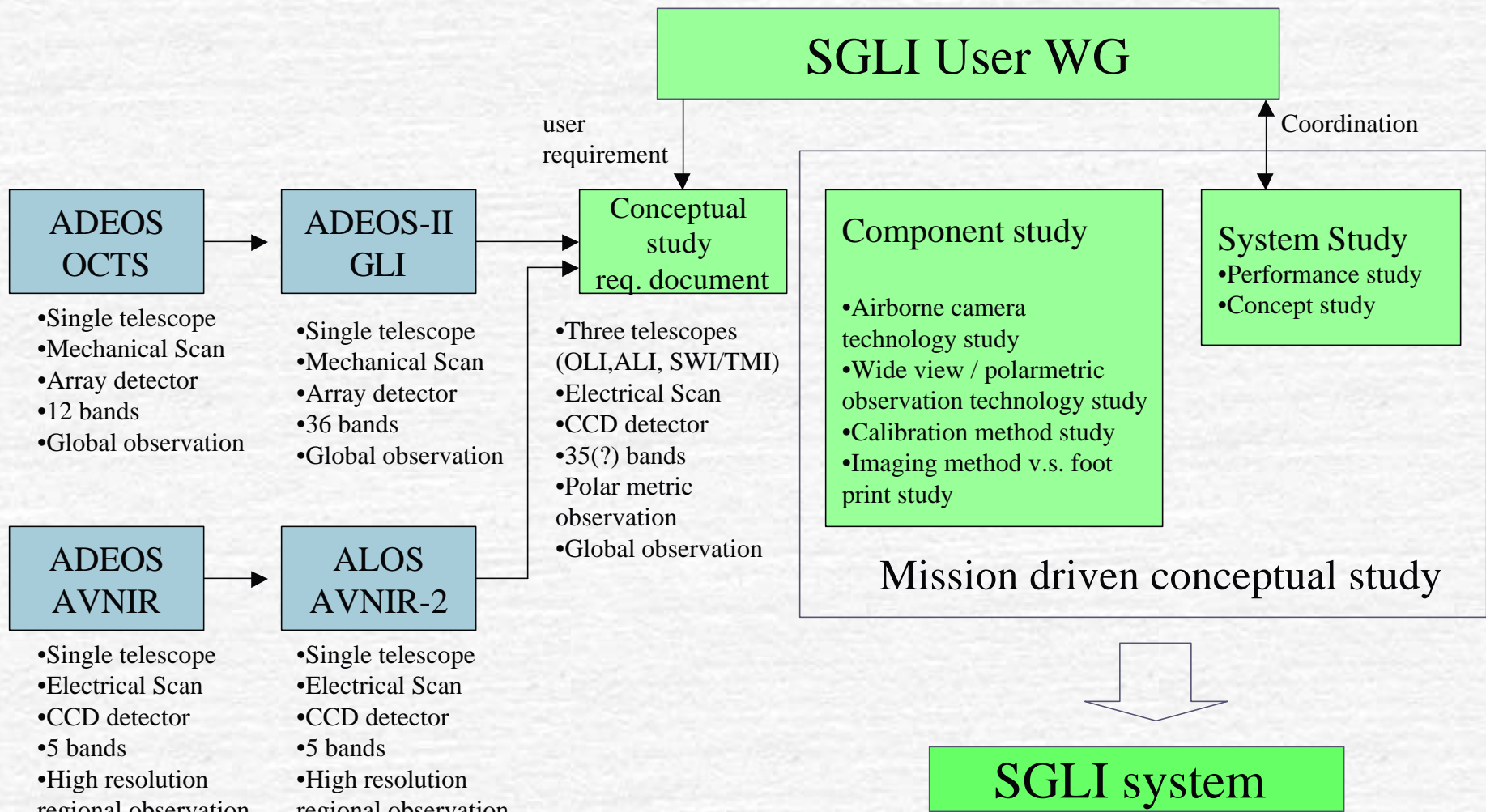
AlphaSCAT (NASA/JPL)
Ocean wind observation

Weight : 2.2 ton
Altitude : 800 km
Sun Synchronous Orbit
(Inclination : 98 deg)

SGLI major activity in JFY2001

- SGLI engineering study
- SGLI user requirement development by SGLI user working group led by Prof. Honda, Chiba university

SGLI Engineering Study Status



SGLI tentative specification proposed by SGLI user working group

OCI

Channel	Center Wavelength(nm)	Wavewidth, nm	Standard Radiance (L?)	Maximum Radiance (Lmax)	S/N	IFOV(m)
O1	412	10-20	65	140	800	1000
O2	443	10-20	54	140	800	1000
O3	490	10-20	43	120	800	1000
O4	520	10-20	31	90	800	1000
O5	565	10-20	23	80	800	1000
O6	625	10-20	17	65	800	1000
O7	678	10-20	12	50	1000	1000
O8	749	10-20	7	32	800	1000
O9	865	10-20	5	20	800	1000

SGLI tentative specification proposed by SGLI user working group

ALI

Channel	Center Wavelength(nm)	Wavewidth, nm	Standard Radiance (L?)	Maximum Radiance (Lmax)	S/N	IFOV(m)
A1	380	10	60	*365	*250	1000
A2	400	10	66	*417	*250	1000
A3	443	10	55	*555	*250	1000
A4-P1	678	20	40 ± 20	430 ± 215	250	1000
A4-P2	678	20	40 ± 20	430 ± 215	250	1000
A4-P3	678	20	40 ± 20	430 ± 215	250	1000
A5	763	8	50	350	*100	1000
A6-P1	865	20	48 ± 24	270 ± 135	250	1000
A6-P2	865	20	48 ± 24	270 ± 135	250	1000
A6-P3	865	20	48 ± 24	270 ± 135	250	1000
A7	940	20	*10	*200	*200	1000
A8	1050	20	34	*261	*150	1000
A9	460	50	40	624	250	250
A10	545	50	25	549	200	250
A11	678	50	25	210	250	250
A12	865	50	20	257	250	250

SGLI tentative specification proposed by SGLI user working group

IRI/SWI

Channel	Center Wavelength(nm)	Wavewidth, nm	Standard Radiance (L?)	Maximum Radiance (Lmax)	S/N	IFOV(m)
S1	1.24	0.02	5	138	150	1000
S2	1.38	0.04	1.5	94	100	1000
S3	1.64	0.15	5	70	150	250
S4	2.21	0.05	1.3	50	100	1000

SGLI tentative specification proposed by SGLI user working group

IRI/TMI

Channel	Center Wavelength(nm)	Wavewidth(nm)	Minimum temp	NEDT for min. temp	Standard temp	NEDT for standard temp	Maximum temp(K)	IFOV(m)
T1	3.7	0.3	TBD	TBD	300	0.1	*340	1000
T2	6.7	0.5	TBD	TBD	300	0.1	300	1000
T3	7.3	0.5	TBD	TBD	300	0.1	300	1000
T4	7.5	0.5	TBD	TBD	300	0.1	300	1000
T5	8.6	0.5	TBD	TBD	300	0.1	340	1000
T6	10.8	0.7	TBD	TBD	300	0.1	340	1000
T7	12	0.7	TBD	TBD	300	0.1	340	1000

Way Forward

- Call for review of proposed specification of SGLI by GLI PI
- Propose to have a SGLI special session during GLI workshop
- Ongoing SGLI engineering study to develop SGLI specification in cooperation with SGLI user working group