

Space Programs in Korea

2006. 12.

Korea Aerospace Research Institute

Contents

. Introduction

. Satellite Program

. Space Launch Vehicle Program

. Space Application

. National Space Development Plan

I. Introduction – KARI

History

1989~

- 1989. 10 : Establishment of KARI affiliated to KIMM (Korea Institute of Machinery &

1996

- Materials)
- 1996. 10 : Independent Organization as KARI

Incorporated Foundation

- 2002. 8 : Cornerstone-Laying Ceremony for the Space Center

2006

Employee : 600 (Ph. D 34%, Master 50%)

Total Budget : 320 million US\$

I. Introduction – KARI

Mission

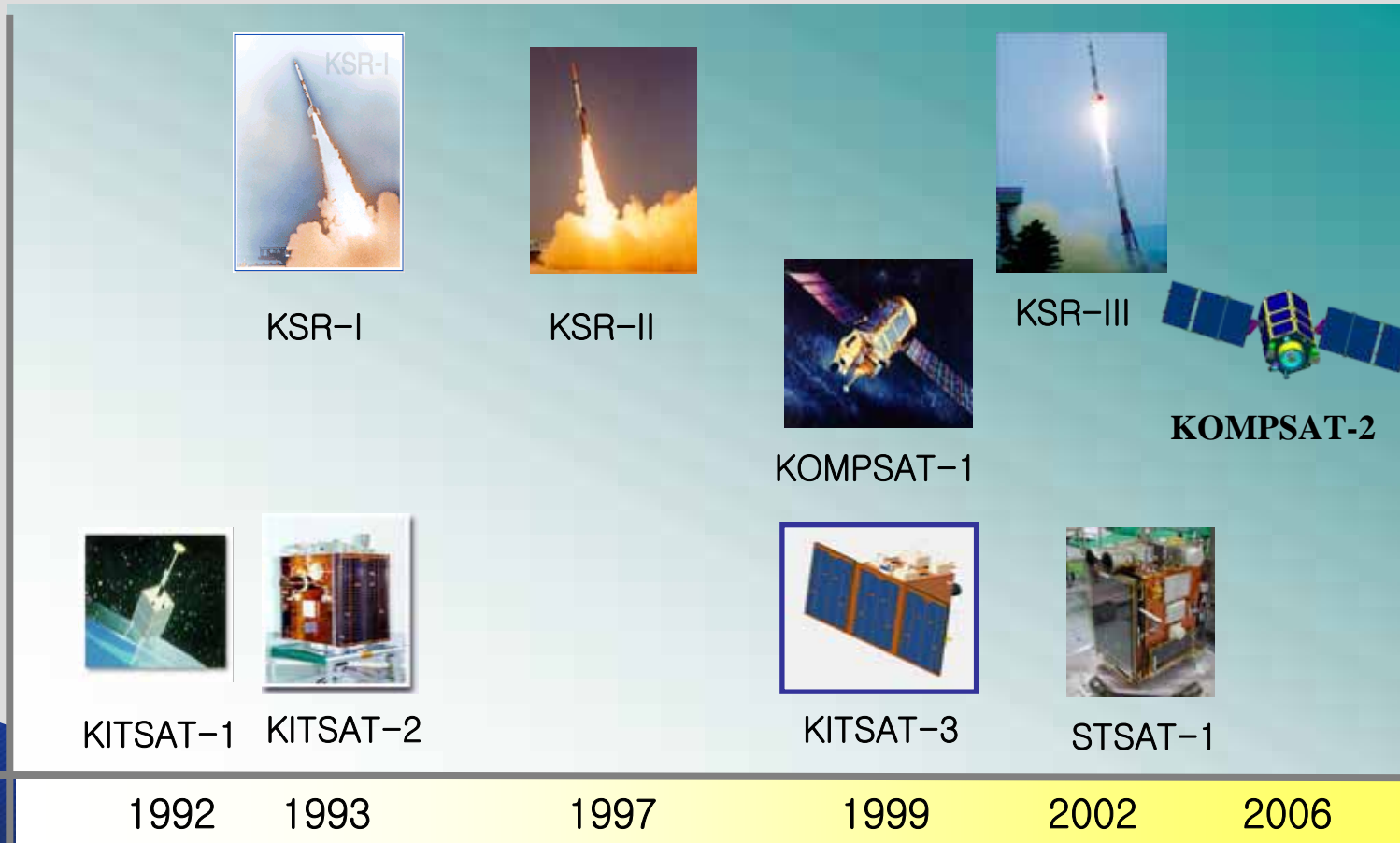
Research Area

- Develop Launch Vehicle, Satellite and Aircraft
- Research Space Science and Space Application
- Verify the Safety and Reliability of Aircraft and Spacecraft

Mission

- Perform Basic and Applied Studies in Aerospace Technology
- Perform Government Delegated Tasks and Support Policy
- Development
Support Industries and Transfer Technology

I. Introduction – History of Korean Space Development



. Satellite Program - Overview

(1) Scientific Satellites

- **KITSAT Series 1, 2, 3: acquisition of key technologies**
- **STSAT 1: prior research on advanced technologies**
- **STSAT 2: domestic development of a LEO 100kg class satellite**

(2) Earth Observation Satellites

- **KOMPSAT 1: currently operating since 1999**
- **KOMPSAT 2: successfully launched in July 28th 2006**
- **KOMPSAT 3: under development with technical support from EADS Astrium**
- **KOMPSAT 5: under development, joint development of payload with AAS-I**

(3) Communication, Ocean, Meteorological Satellite

- **COMS-1: joint development of GOCI¹⁾ with EADS Astrium**

※ **GOCI¹⁾ : Geo-Ocean Color Images**

. Satellite Program- Scientific Satellites

□ KITSAT- Series



• Mission

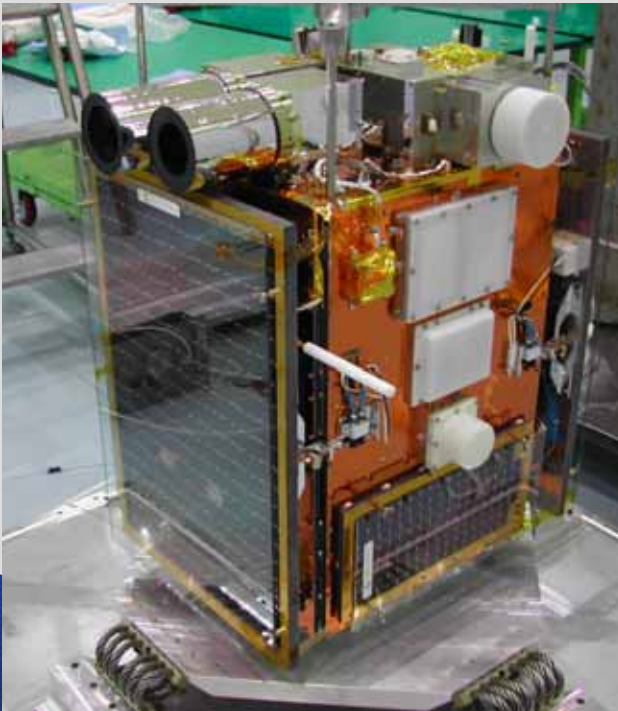
- 1 : Earth Observation (Res. 400m), Scientific Experiments
- 2 : Earth Observation (Res. 200m), Scientific Experiments
- 3 : Earth Observation (Res. 13.5m), Scientific Experiments

• Details

No.	Wt.	Orbit	Launch	Life Span
1	50kg	1,300km	Aug.1992	3yr
2	50kg	820km	Sep. 1993	3yr
3	110kg	720km	May 1999	3yr

. Satellite Program- Scientific Satellites

□ STSAT-1 (Science and Technology Satellite-1)



- **Development Outline**

- Period : Oct. '98 ~ Dec. '03
- Development by SaTReC / KARI
- Launch : 2003

- **Payload**

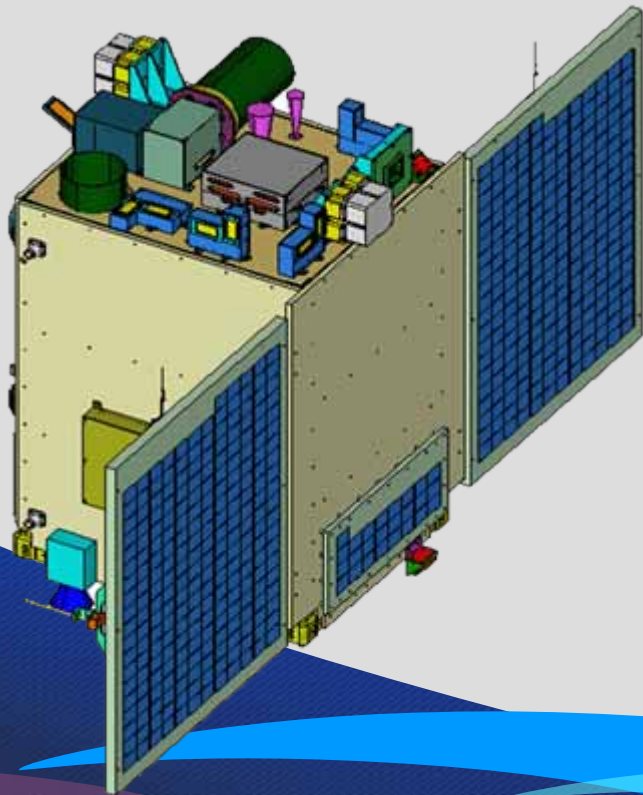
- Far ultra-violet Imaging Spectrograph
- Space Physics Package

- **Configuration**

- BUS 0.67m X 0.55m X 0.83m
- Weight : 106kg

. Satellite Program- Scientific Satellites

□ STSAT-2 (Science and Technology Satellite-2)



- **Development Outline**

- Period : Oct. '02 ~ Dec. '05
- Development by SaTReC / KARI
- Launcher : KSLV-1 (2007)
(Korea Space Launch Vehicle-1)

- **Payload**

- Microwave Radiometer
- Satellite Laser Reflector

- **Configuration**

- BUS 0.65m X 0.62m X 0.93m
- Weight : 100kg

. Satellite Program- Earth Observation Satellites

□ KOMPSAT-1 (Korea Multi-Purpose Satellite-1)

- **Development Outline**

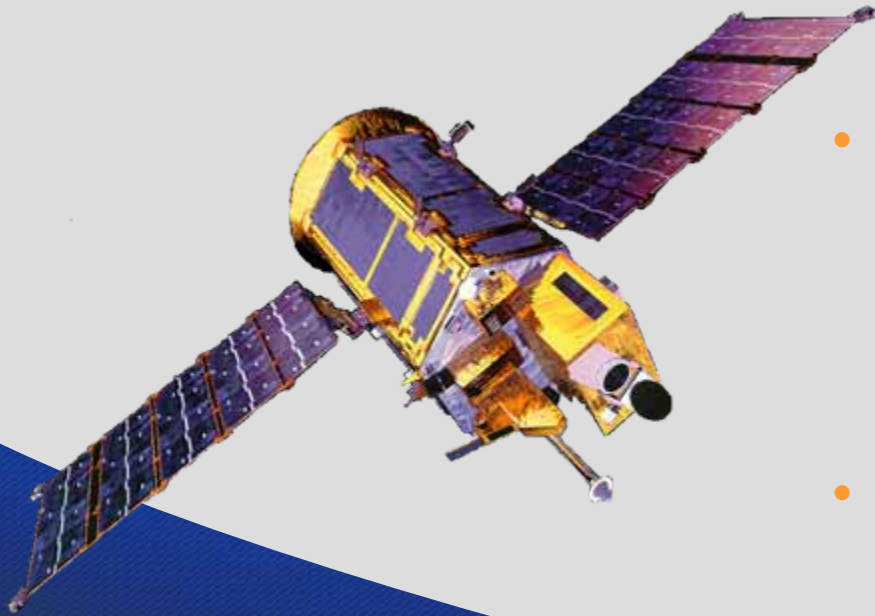
- Period : Nov. '94 ~ Jan. '00
- Joint development by KARI & TRW
- Launch : Dec. 22, 1999

- **Mission**

- Cartography of Korean peninsula
- Ocean Observation
- High energy particles & Ionosphere measurement

- **Configuration**

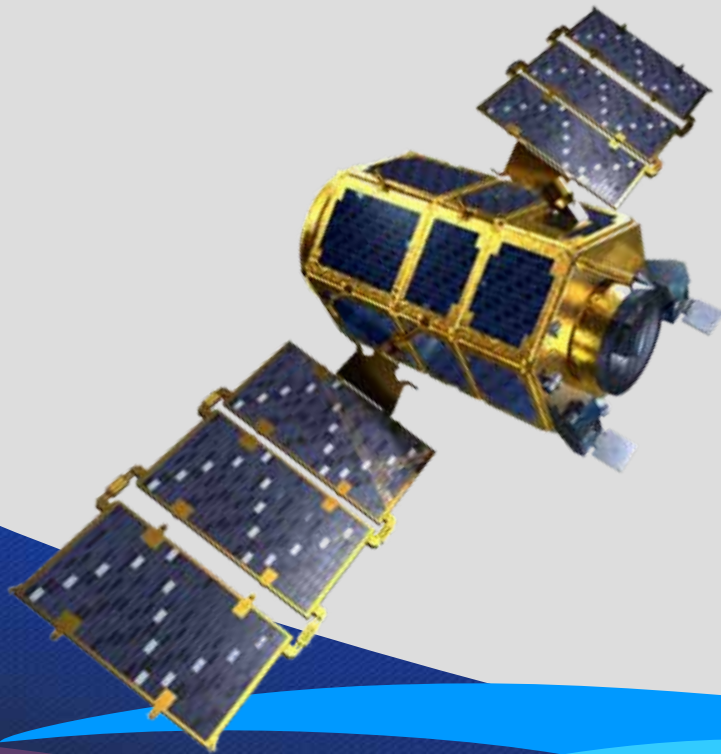
- BUS Diameter 1.35 m X Height 2.5 m
- Weight : 470 kg
- Resolution : 6.6 m (B/W)



. Satellite Program- Earth Observation Satellites

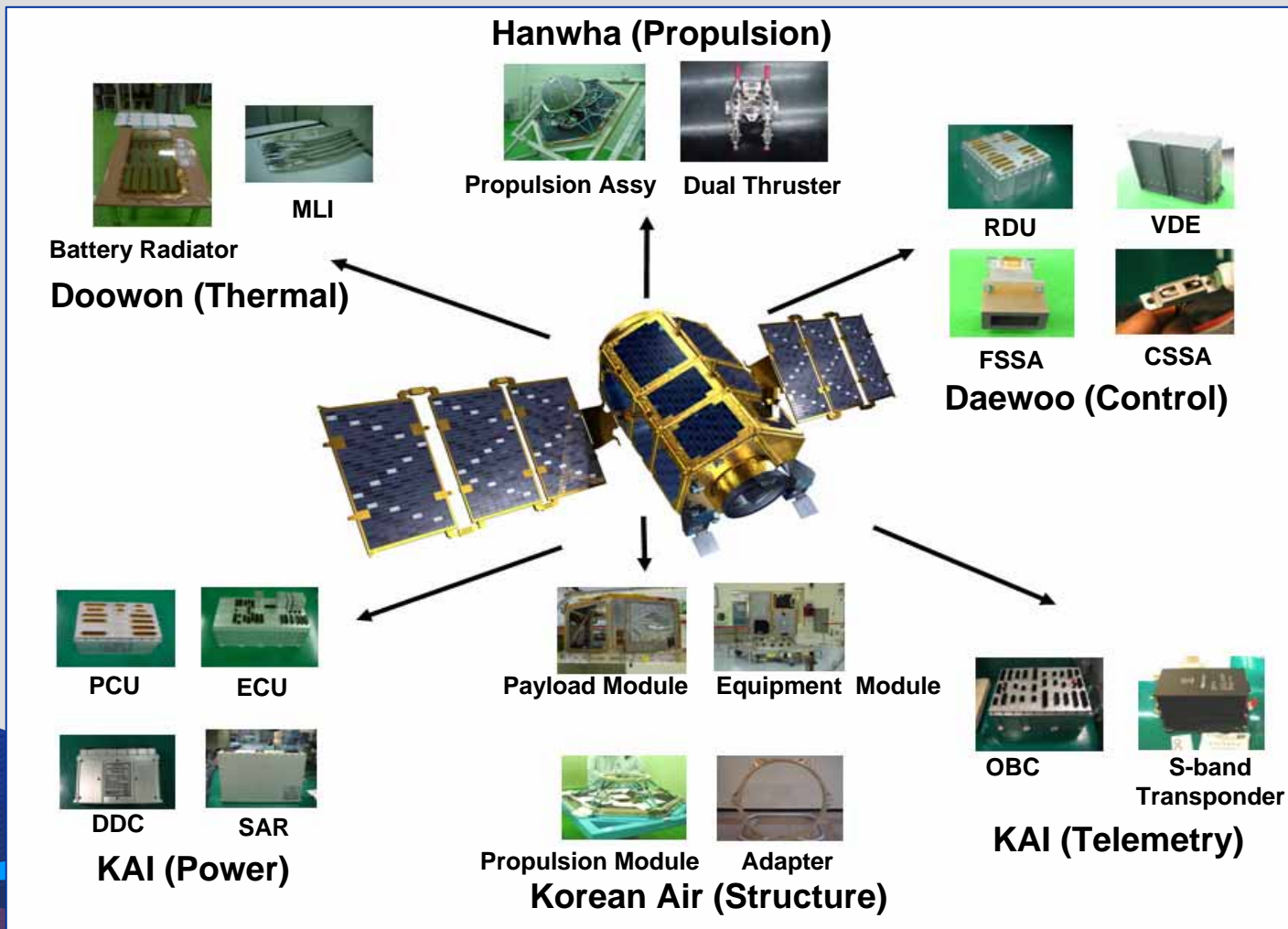
□ KOMPSAT-2 (Korea Multi-Purpose Satellite-2)

- **Development Outline**
 - Period : Dec. '99 ~ Aug. '06
 - Indigenous Development by KARI
- **Payload : Multi-Spectral Camera**
 - Resolution : 1m panchromatic,
4m color
 - Joint development by KARI & ELOP
- **Configuration**
 - BUS Diameter 1.85m X Height 2.6m
 - Weight : 800kg



. Satellite Program- Earth Observation Satellites

< KOMPSAT-1 & 2 Key Components Development >



MLI : Multi-Layer Insulator
 DDC : Deployment Device Controller
 RDU : Remote Drive Unit

PCU : Power Control Unit
 SAR : Solar Array Regulator
 FSSA : Fine Sun Sensor Assy

ECU : EPS Control Unit
 VDE : Valve Drive Electronics
 KAI : Korea Aerospace Industries

. Satellite Program- Earth Observation Satellites

◆ Launch Vehicle (Left) & Launching Image of KOMPSAT-2 (Right)

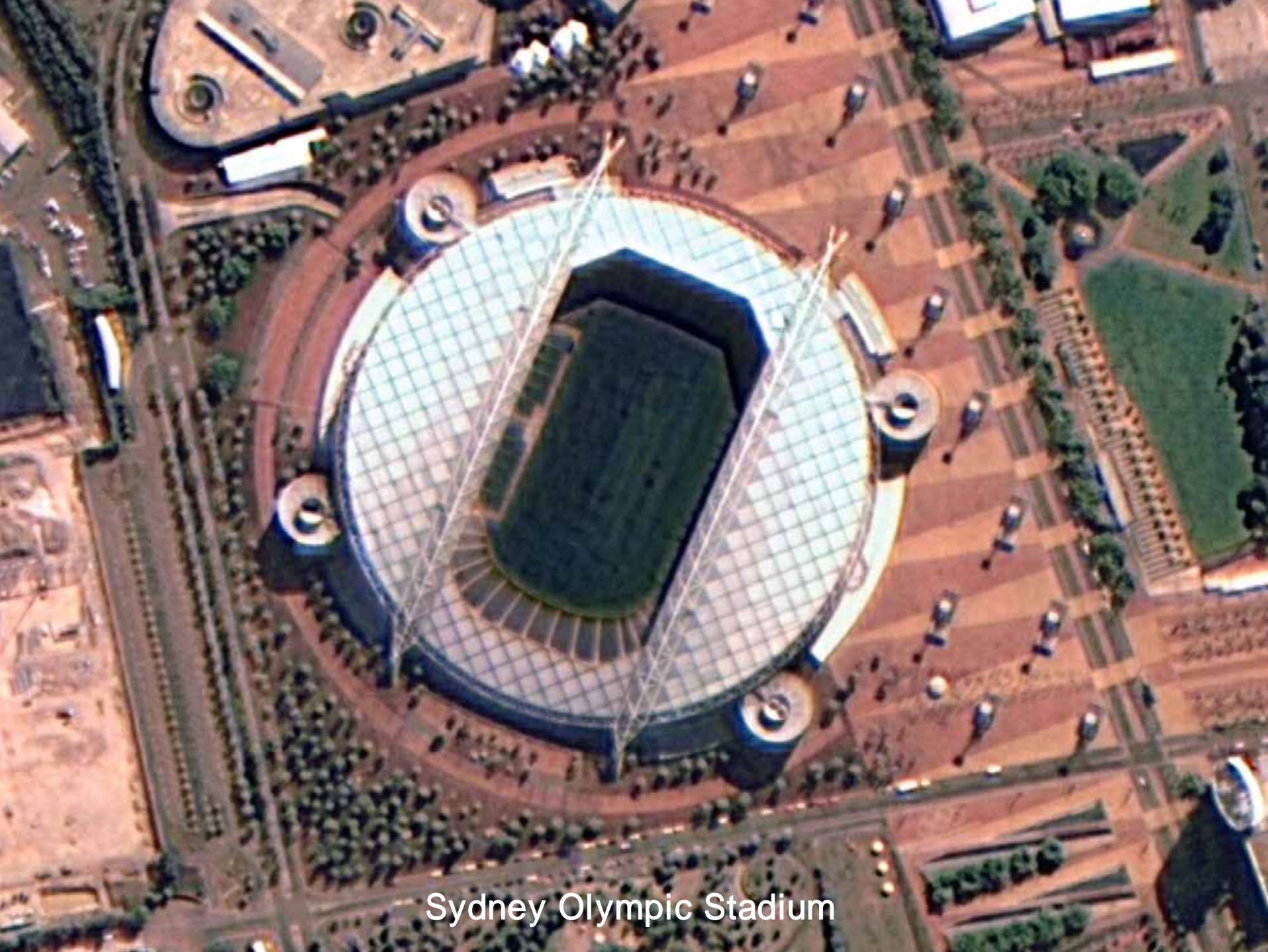


SS19 ICBM



Launching (Real)
(17'')





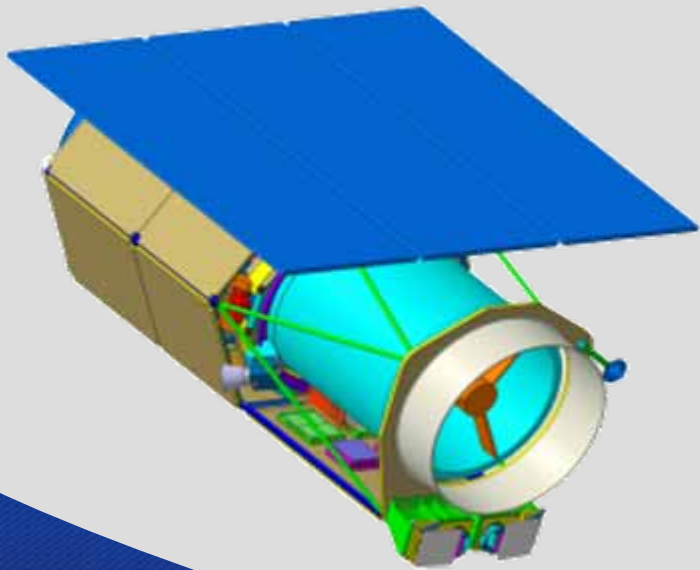
Sydney Olympic Stadium



Moving Cars on
Brooklyn Bridge

. Satellite Program- Earth Observation Satellites

□ KOMPSAT-3



- **Development Outline**

- Period : Jul. 2004 ~ Nov. 2009
- Indigenous Development by KARI

- **Payload : Multi-Spectral Camera**

- Resolution : Sub-meter panchromatic,
3.2m color
- Indigenous Development by KARI
with the technical support of EADS Astrium

- **Configuration**

- Weight : 900kg

. Satellite Program- Earth Observation Satellites

□ Image Comparison (Incheon International Airport)



KOMPSAT-1(6.6m Res.)



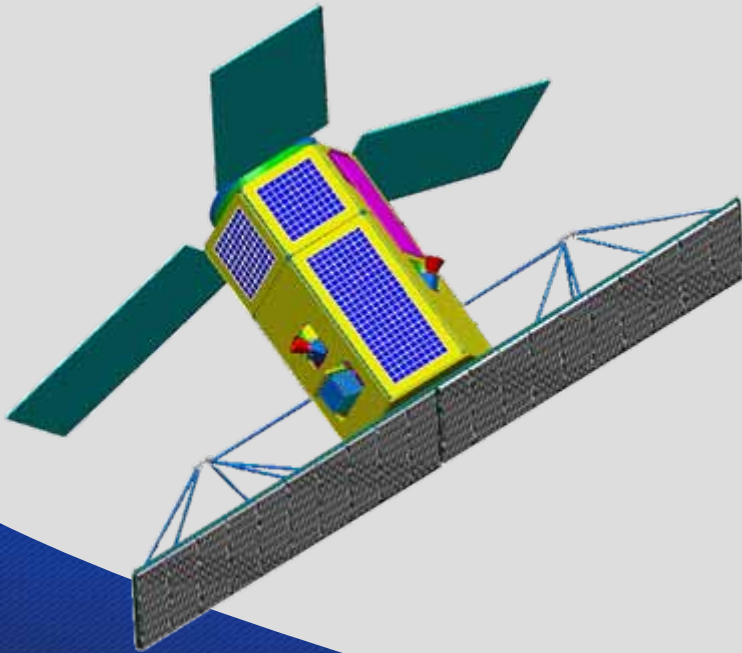
KOMPSAT-2(1m Res.)



KOMPSAT-3

. Satellite Program- Earth Observation Satellites

□ KOMPSAT-5



- **Development Outline**

- **Period : June 2005 ~ June 2009**
- **Indigenous Development by KARI**

- **Payload : SAR**

(Synthetic Aperture Radar)

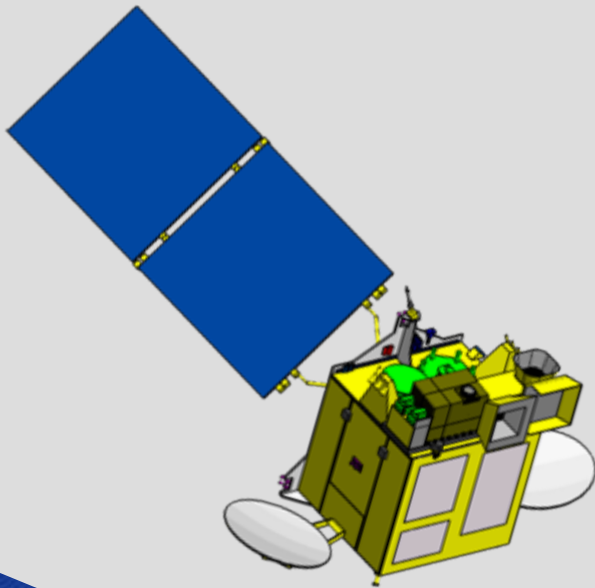
- **Resolution : 3m in standard mode**
- **Joint Development by KARI & Alcatel Alenia Space (AAS)-Italia**

- **Configuration**

- **Weight 1,280kg**

. Satellite Program- COMS

□ COMS-1(Communication,Ocean and Meteorological Satellite-1)



- **Development Outline**

- Period : Sep. '03 ~ Dec. '08
- Joint Development by KARI & EADS Astrium
- Launch : 2008

- **Mission**

- Meteorological Observation
- Ocean Monitoring
- Development of next generation Communication Payload Technology

- **Configuration**

- BUS 2.6m X 1.8m X 2.8m
- Weight : 2.3 ton

. Space Launch Vehicle Program

□ Sounding Rocket Program



Launch of KSR II

- **KSR I : Single Stage Solid Propellant Sounding Rocket (1993)**
- **KSR II : Two Stage Solid Propellant Sounding Rocket (1997)**
- **KSR III : Liquid Propellant Sounding Rocket (2002)**

. Space Launch Vehicle Program

□ Space Center

○ Space Center is Under Construction

- Location : Oenaro-Island, GO-HUNG, Southern part of Korea
- 1st Phase construction of Space Center will be completed in 2007 for launch of KSLV-1



□ Naro Space Center



- | | | | | | | |
|-------|-------|--------|------------------|---------|---------------------|--------|
| 1 LPC | 3 ITC | 5 EOTS | 7 Adm. Bldg. | 9 EP | 11 Visitor's Center | 13 WRF |
| 2 ETF | 4 MCI | 6 TRS | 8 Residence Hall | 10 Gate | 12 Jeju TS | |

. Satellite Application

(1) Remote Sensing

- Disaster management using KOMPSAT and other earth observation satellite data
- KOMPSAT-2 and COMS-1 Satellite data will be used in the near future

(2) Space Science

- Space science research carried by KARI, KASI, SaTReC and universities

(3) Astronaut Project

- Two Korean astronaut candidates will be selected by the end of 2006
- Will be trained in Russia from January 2007 to March 2008
- Korean astronaut performs several missions in the ISS

. Satellite Application – Remote Sensing

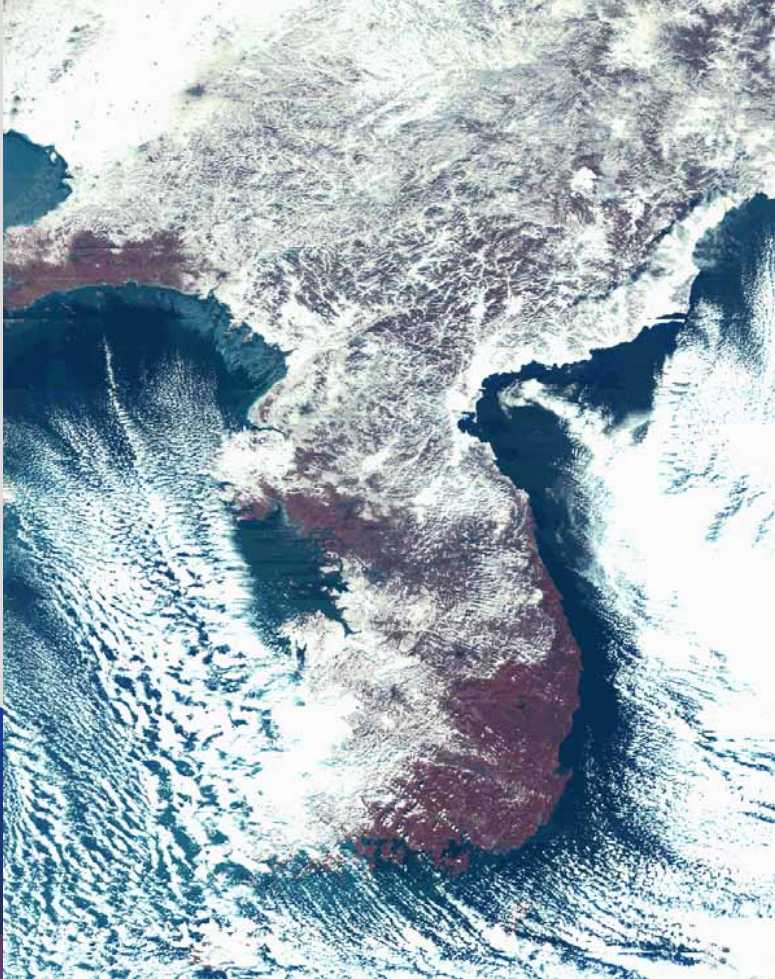
□ KOMPSAT - I

Seoul (EOC Image Mosaic)
2000.2.15 (L)+2000.1.20 (R)

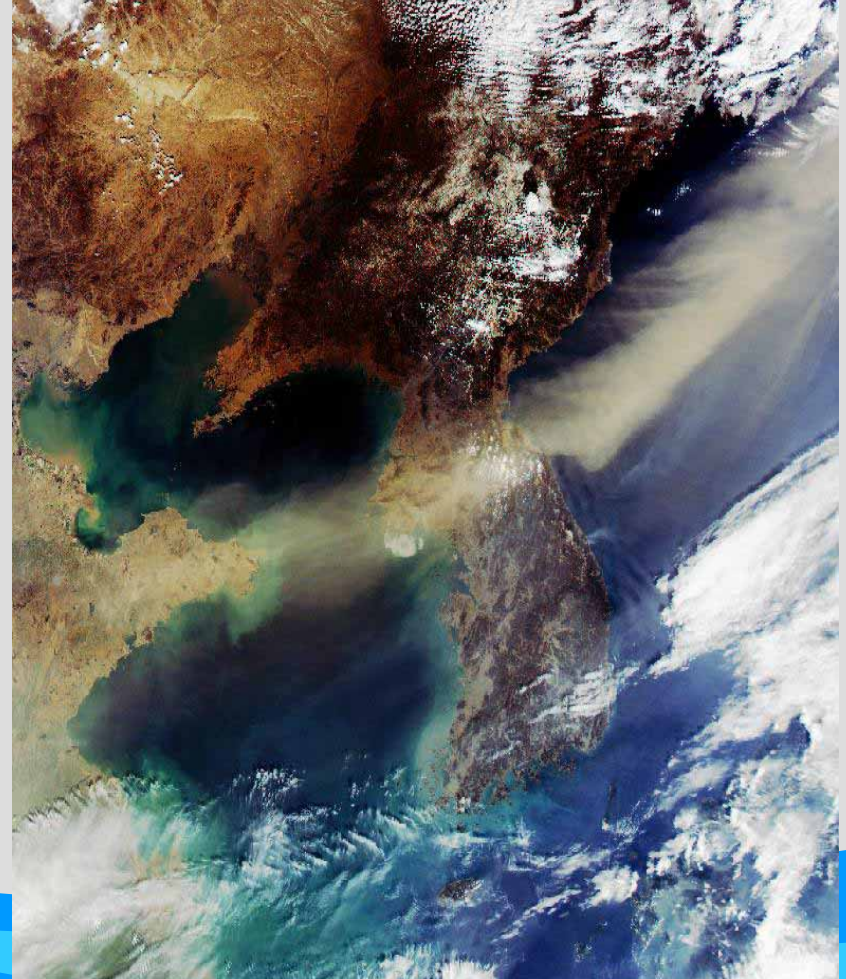


. Satellite Application – Remote Sensing

□ KOMPSAT - I



Korean peninsula



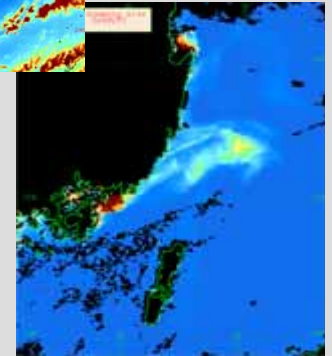
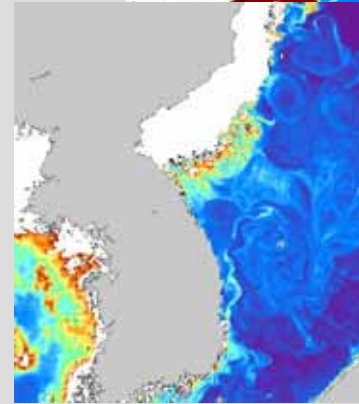
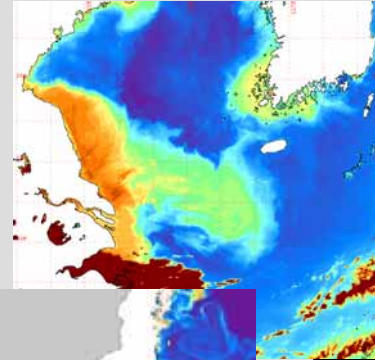
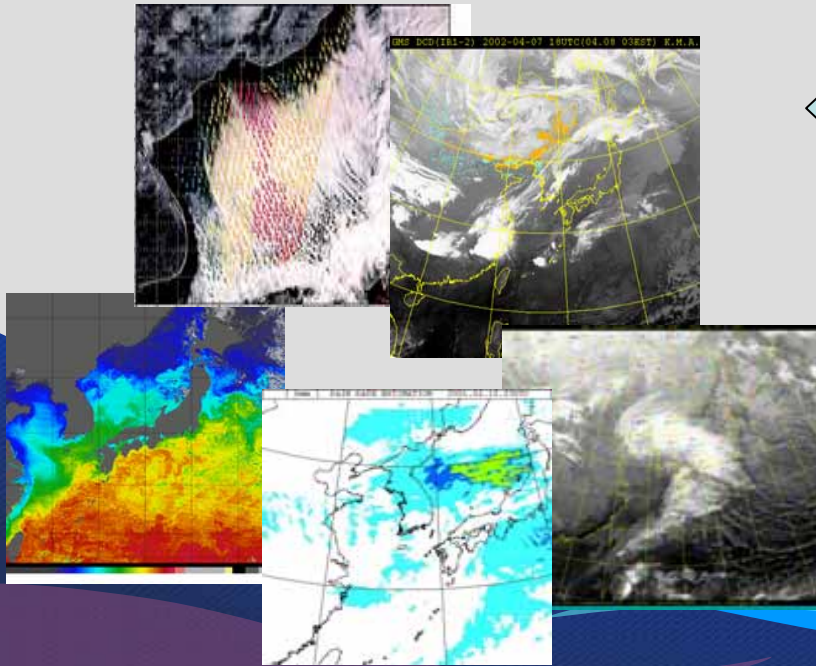
Observation of Yellow Sand

. Satellite Application – Remote Sensing

□ COMS Application

Meteorological Service

- Continuous monitoring with high-resolution and multi-spectral image
- Early detection of special weather
- Long-term change of sea surface temperature and cloud



Ocean Monitoring

- Monitoring of marine environments around Korean peninsula
- Production of fishery information (Chlorophyll, etc.)
- Monitoring of long-term/short-term change of marine ecosystem

. Satellite Application – Space Science

□ KARI: Scientific researches using satellites and sounding Rockets

- KITSAT Series: measured global high-energy particle distribution etc.
- KOMPSAT-1: global ionospheric measurements and high-energy particle experiments
- Sounding rockets: the ionospheric and ozone layer experiments

□ KASI: Astronomical researches in space

- developed X-ray detector system for sounding rockets
- participated in Far-Ultraviolet Imaging Spectrograph project

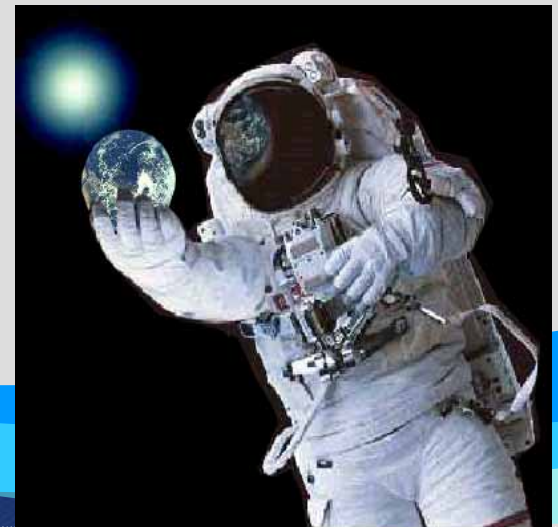
□ CSA: The center for space astrophysics

- participated in the development and operation of space UV telescope
- participating in NASA's new UV space telescope program (GALEX)

. Satellite Application – Astronaut Project

□ Korea Astronaut Project

- International space project between Korea and Russia
- Selection number of final astronaut candidates : 2 candidates (End of 2006)
- Training : 1.5 years starting in 2007 at GCTC (Russia)
- Year of final selection : 2008 (1 astronaut)
- Launching spacecraft : Soyuz (Russia)
- Mission : Space experiments on the ISS using Russian equipment and small experimental equipment made by Korea



V. National Space Development Plan

A. Third Revision of the National Space Development Plan (2005. 5.17, National Science and Technology Council)

- **Revise the Objectives of the Basic Plan to reflect the national and international changes in environment as well as the possibility of implementation for space technology development**
- **Divide the 20 year(1996~2015) Basic Plan into a 「 Long-Term Plan 」 and a 「 Mid-Term Plan 」 (next 5 years)**
 - **Long-Term Plan defines the long-term directive and objectives for space development**
 - **Mid-Term Plan defines the specific objectives and plans for space development in 5 year increments**
- **Strengthen international cooperation and R&D in fundamental technologies**

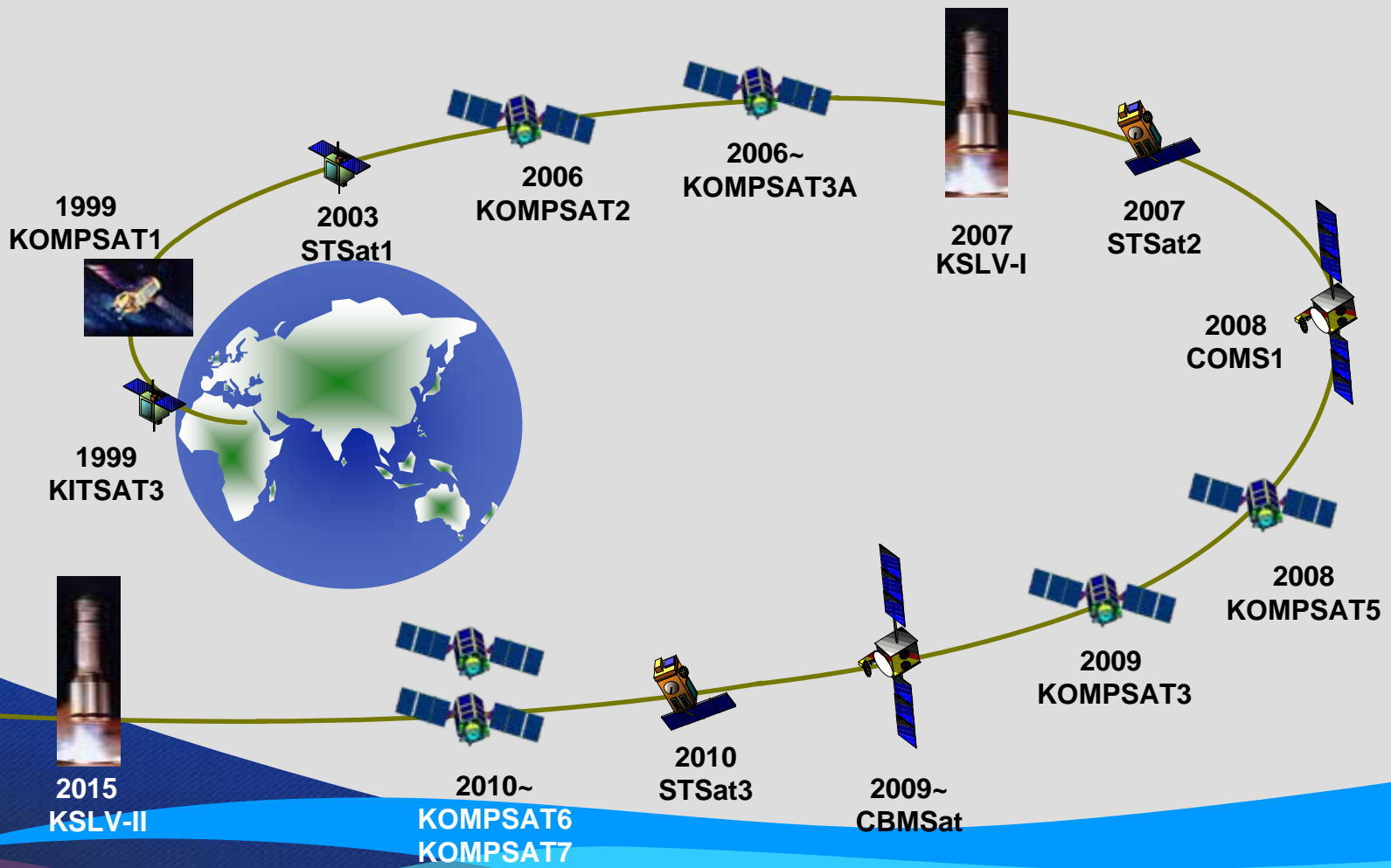
V. National Space Development Plan

B. Satellite Development

- 20 satellites by 2015 revised to 13 satellites by 2010 (incl. 4 in the development phase)
- Communication, Broadcasting and Meteorological Satellite changed to Communication, Ocean Monitoring and Meteorological Satellite (GEO)
- Early development of a SAR satellite for all-weather, high-resolution earth observation (2010 launch year moved to 2008)

Present Plan (20 sats by 2015)		Revised Plan (13 sats by 2010)	
Category	Number	Category	Number
Geostationary	5	Geostationary	2
Multipurpose	8	Multipurpose	7
Science	7	Science	4

< National Space Development Plan >





Thank You!