

# SELENE “Kaguya”

## SELenological and ENgineering Explorer

**SELENE (Kaguya)** will conduct lunar global mapping with 15 missions, leading to a thorough understanding of lunar crust, interior, and surrounding environments, especially

- first direct gravimetry of lunar far-side by 4way doppler method.
- detailed subsurface structure by ground-penetrating radar sounder.
- high sensitive identification of elements using Germanium gamma-ray detector.

and other high precision observations of surface chemistry, mineralogy, geomorphology, magnetism, internal structure, plasma environments, etc.

### SELENE Mission

#### Objectives:

- **Science of /on/ from the Moon (Global Survey of the Moon )** : Composition, 3D-Topography, Gravity, Magnetism, Evironments
- **Technology development for future lunar exploration** : Lunar Insertion, Orbital Correction Maneuver, Telecommunication
- **Public outreach of the Lunar exploration** : Broadcasting High-Definition TV movie of the Earth-rise /Moon surface

#### Spacecraft Configuration:

- **Main Orbiter** : size : 4.8 x 2.1 x 2.1 [m], mass : 2.9 [t], power : 3.5 [kW]
- **Relay Satellite (Rstar)**: size :  $\phi 1 \times 0.65$ [m], mass : 50 [kg]
- **VLBI Satellite (Vstar)**: size :  $\phi 1 \times 0.65$ [m], mass : 50 [kg]

#### Mission Orbit:

- **Main Orbiter** : 100 [km] (circular),
- **Rstar** : 100 x 2400 [km] (elliptical),
- **Vstar** : 100 x 800 [km] (elliptical),

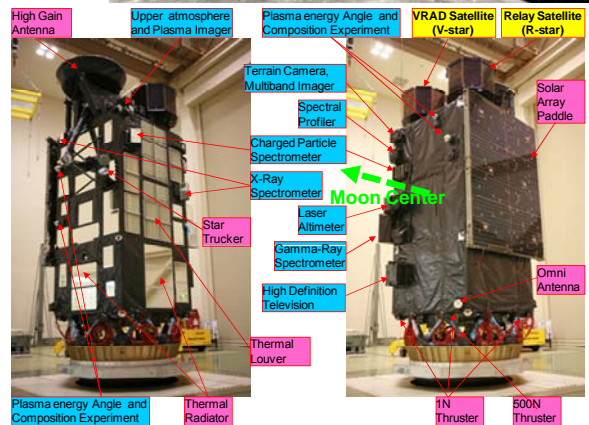
#### Telemetry:

- **Mission** : 10 Mbps (X-band)
- **House Keeping** : 40 Kbps (S-band)

#### Schedule:

- **Launch**: 14 Sep 2007 by H-2A-13,
- **LOI**: 4 Oct 2007
- **Duration**: 1.1year (plus optional extended mission)

Launch on  
14 Sep 2007



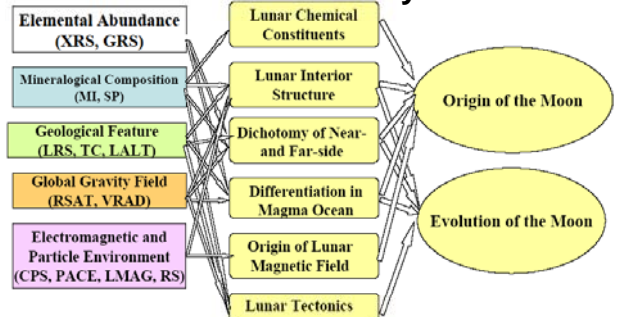
### SELENE 15 Observation Missions

#### Instruments:

- Selected to achieve the science goals
- Integrated science topics : crustal evolution, tectonics in lunar maria, multi-ring basin formation, ices in polar region

X-ray Spectrometer (XRS)	Global mapping of Al, Si, Mg, Fe distribution using 100 cm <sup>2</sup> CCD. spatial resolution 20 km. Energy range 0.7-8 keV, 5μm Be film, Solar X-ray monitor
Gamma-ray Spectrometer (GRS)	Global mapping of U, Th, K, major elements, d distribution using 250 cm <sup>2</sup> large pure Ge crystal. Spatial resolution 100 km. Energy range 0.1-10 MeV
Multi-band Imager (MI)	UV-VIS-NIR CCD & InGaAs imager, spectral bandwidth from 0.4 to 1.6 microns, 9 bands filters, spectral resolution 20-30 nm, spatial resolution 20-60 m
Spectral Profiler (SP)	Continuous spectral profile ranging from 0.5 to 2.6 microns, spectral resolution 6-8 nm, spatial resolution 500 m
Terrain Camera (TC)	High resolution stereo camera, spatial resolution 10 m
Lunar Radar Sounder (LRS)	Mapping of subsurface structure using active sounding, frequency 5 MHz, echo observation range 5 km, resolution 75 m, Detection of radio waves (10k-30MHz) from the Sun, the Earth, Jupiter, and other planets
Laser Altimeter (LALT)	Nd-YAG laser altimeter, 100 mJ output power, height resolution 5 m, spatial resolution 1600 m with pulse rate 1 Hz, Beam divergence 3 mrad
Differential VLBI Radio Source (VRAD)	Differential VLBI observation from ground stations, selenodesy and gravitational field, onboard two sub-satellites, 3 S-bands and 1 X-band
Relay Satellite Transponder (RSAT)	Far-side gravimetry using 4 way range rate measurement from ground station to orbiter via relay satellite, perilune 100 km, apolune 2400 km in altitude, Doppler accuracy 1 mm/s
Lunar Magnetometer (LMAG)	Magnetic field measurement using flux-gate type magnetometer, accuracy 0.5 nT
Charged Particle Spectrometer (CPS)	Measurement of high-energy particles, 1-14 MeV(LPD), 2-240 MeV(HID), alpha particle detector, 4-6.5 MeV
Plasma Analyzer (PACE)	Charged particle energy, angle and composition measurement, 5 eV/q - 28 keV/q
Radio Science (RS)	Detection of the tenuous lunar ionosphere using S and X-band carriers
Plasma Imager (UPI)	Observation of terrestrial plasmasphere from lunar orbit. XUV(304A) to VIS
High Definition Television(HDTV)	Taking pictures and movies of the Earth and the Moon with high-definition television

### Science Goals: Global Survey of the Moon



### Public Outreach:

