Summary of Nominal Mission Phase

January 2009

SELENE Mission Operation

2007	2008	2009
Sep.-Dec.	Jan.-Oct.	Nov.-

Launch

Critical phase

Bus instrument checkout

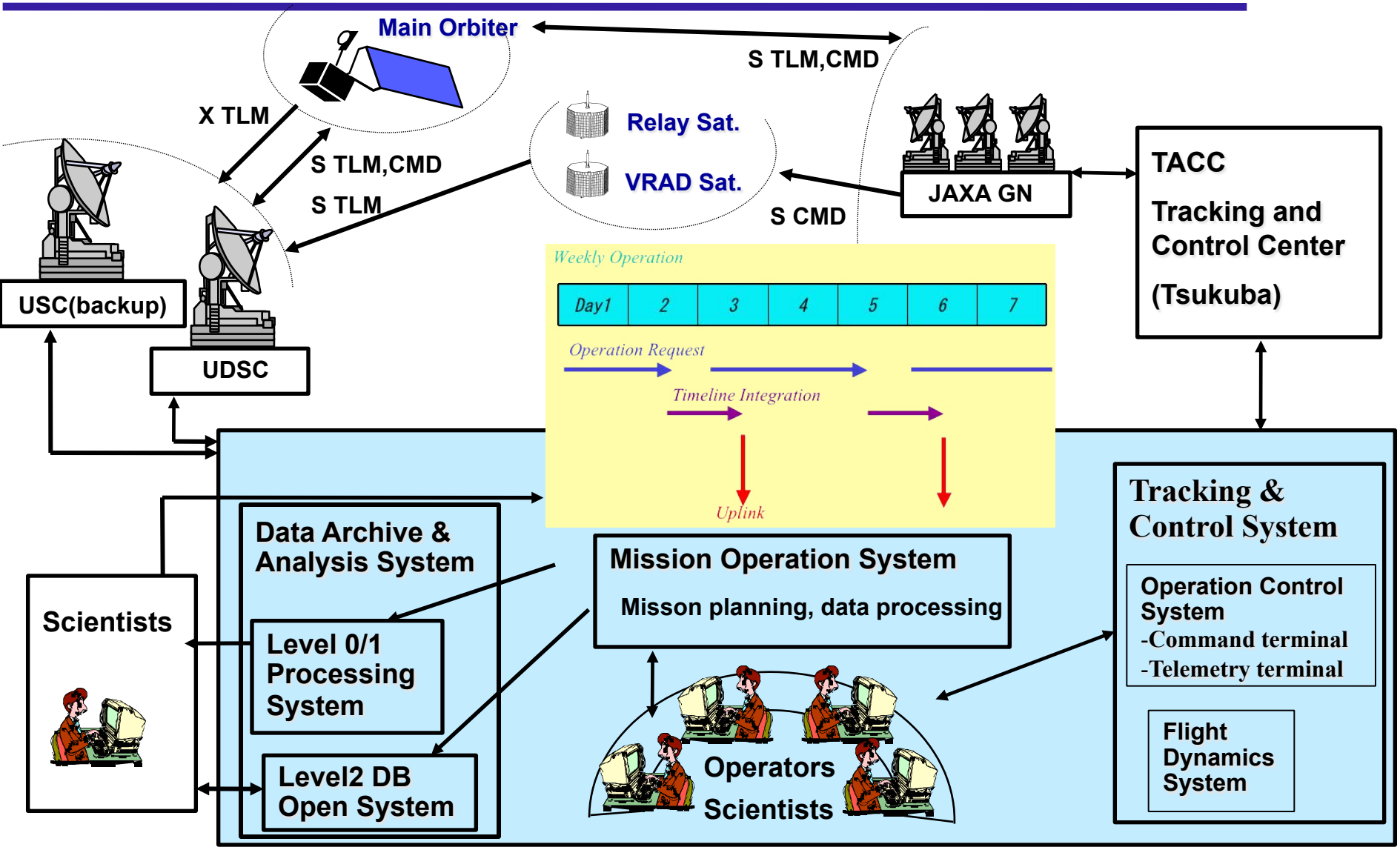
Mission Instrument checkout

Nominal mission phase

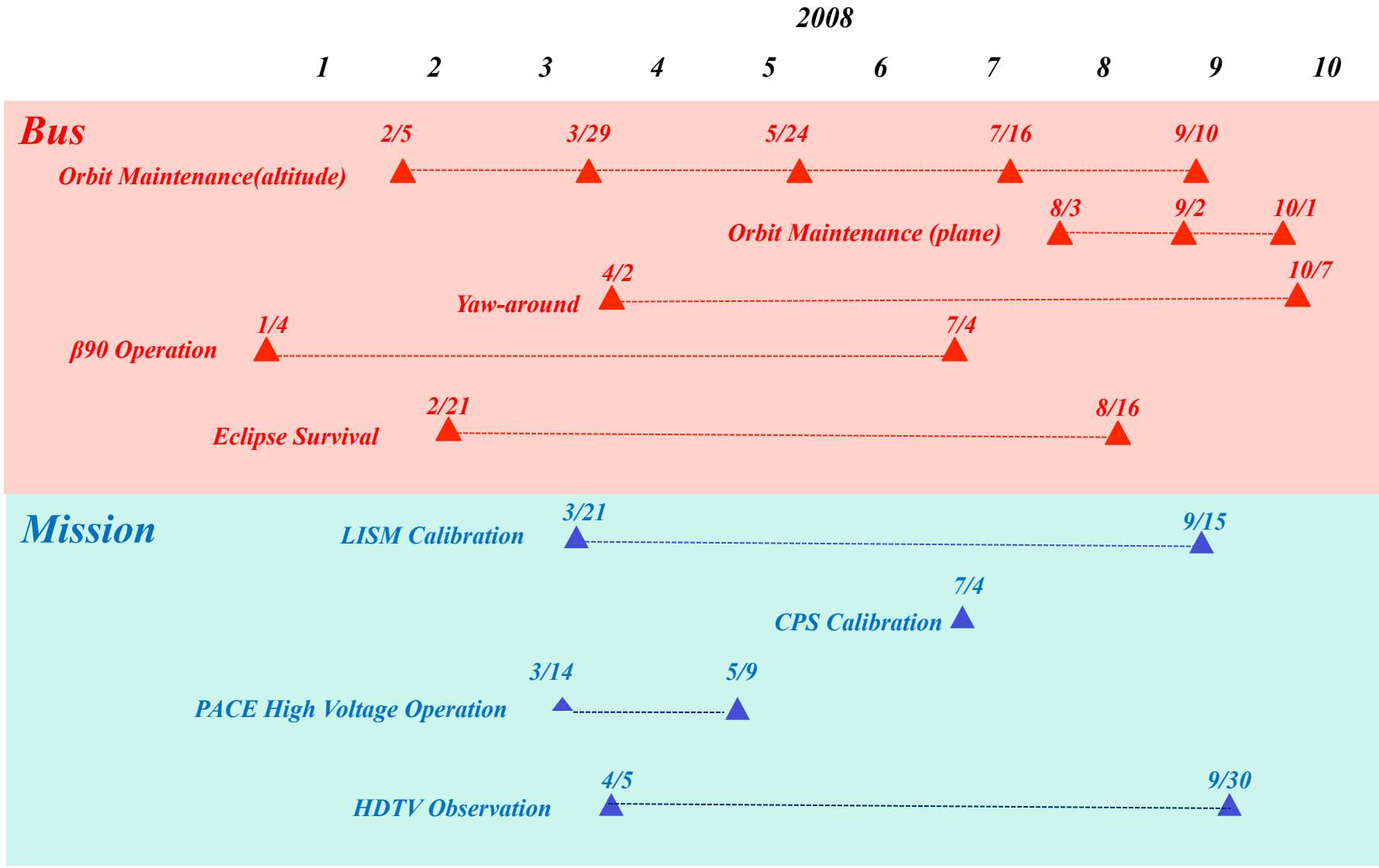
Extended mission

We are here.

Operation in nominal mission phase



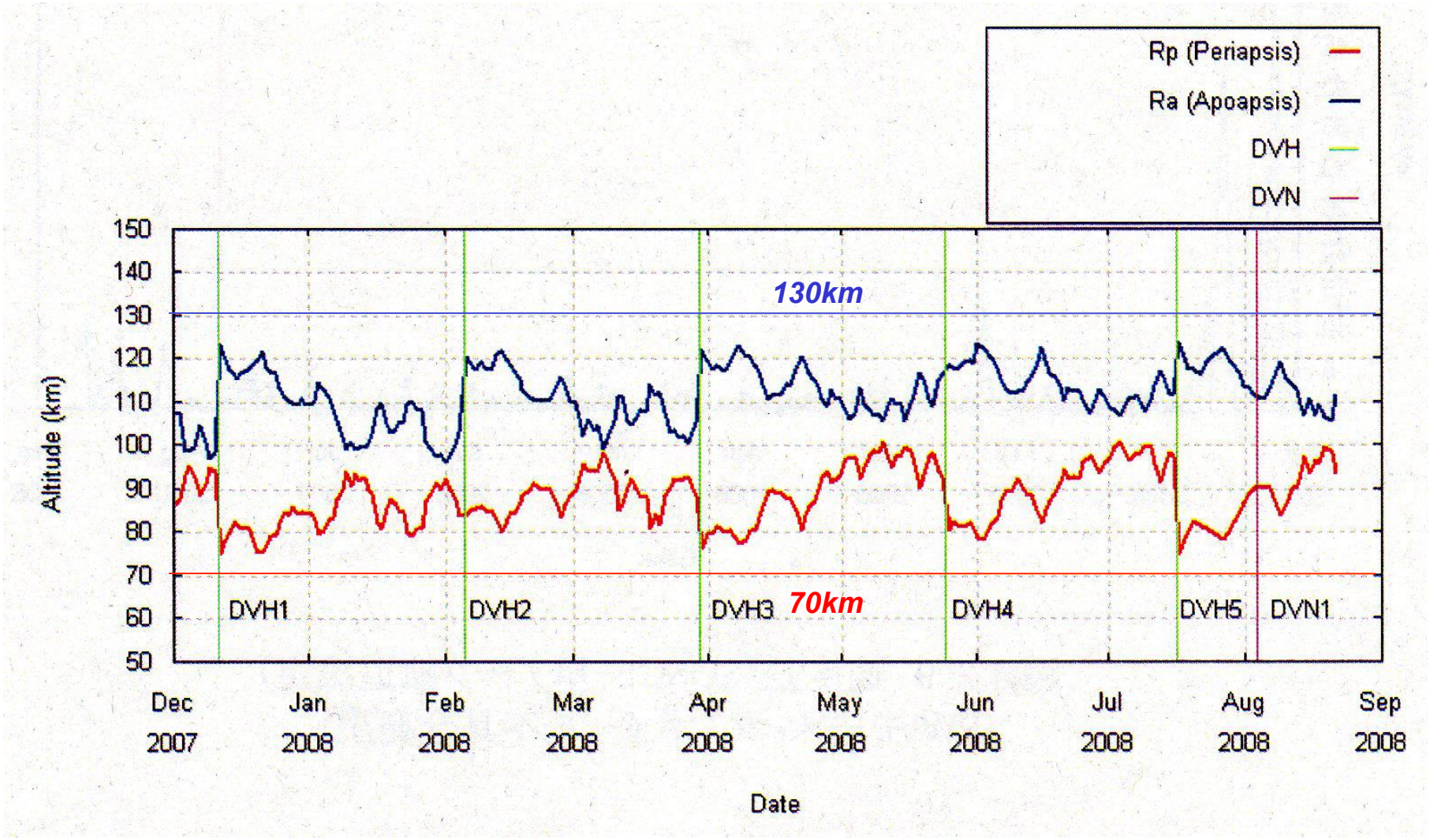
Special Operation during Nominal Mission Phase



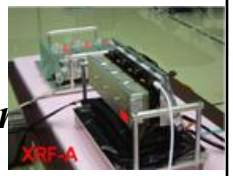
Major Results of Bus System Operation

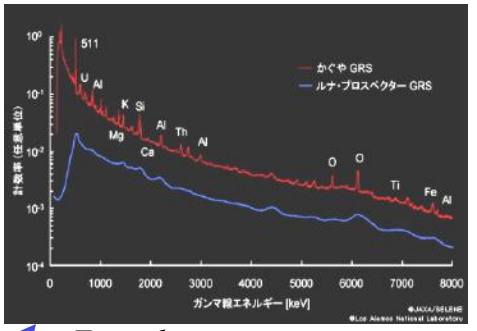
Function	*Performance*
Orbit Maintenance	*altitude control maneuver 5 times, keeping 100±30 km as planned* *plane control 3 times as planned*
Attitude Control	*three axis control (moon pointing) within ±0.1° as planned* *RW#1 failed July 2008, but three others worked, satisfying observation requirements.*
Power Generation and Supply	*Power generation as planned* *DOD<21% (nominal operation) in specification* *DOD<60% (eclipse) in specification*
Data Management	*worked as planned*
Thermal Control	*within specification*

Orbit Maintenance History

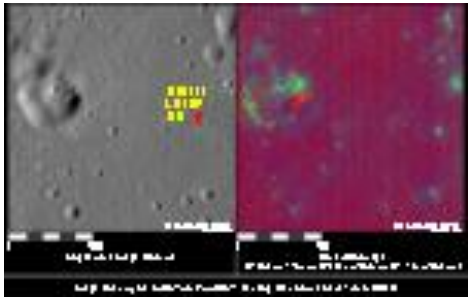


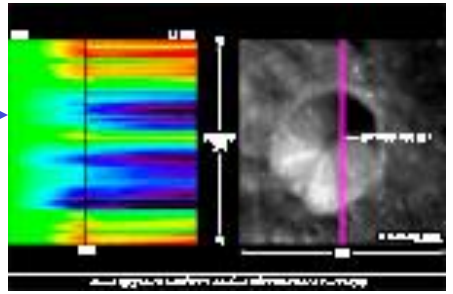
Major Results of Mission Instruments (1/3)

Instruments	Major Results
X-ray Spectrometer 	Unsatisfactory results by CCD noises due to radiation damage and extremely low solar activities
Gamma-ray Spectrometer 	Element abundance for K,Th, U, Ca, Si, Ti etc., were obtained as planned. Extended observation was required due to temporal sensor problem.
Multi-band Imager 	Mineral distribution was measured as planned.
Spectral Profiler 	Mineral composition was measured as planned.

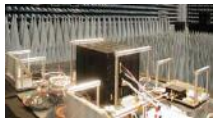
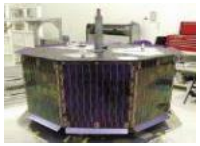
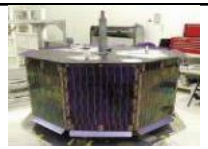


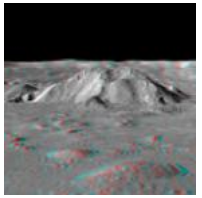
Typical energy spectrum


Data for Apollo 11 Landing site

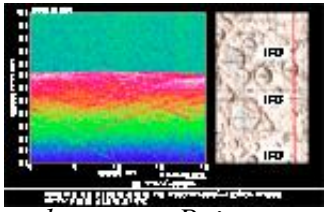

Typical example of spectrum crossing a crater

Major Results of Mission Instruments (2/3)

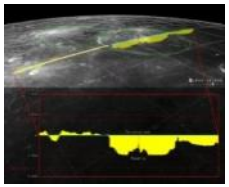
Instruments	Major Results
Terrain Camera 	Geological features were observed as planned.
Lunar Radar Sounder 	Subsurface structure was observed as planned. Observation stopped last September due to circuit anomaly.
Laser Altimeter 	Topographical data were obtained as planned.
Relay Satellite 	Gravity field including gravity anomalies in the far side was measured as planned.
Differential VLBI Radio Source 	Gravity field of the Moon was measured as planned.



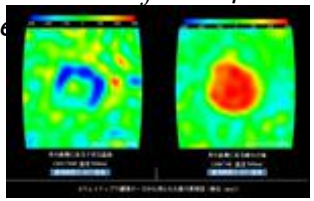
Tycho crater



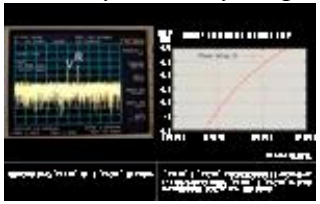
Radar echoes near Poisson crater



Cross-section of Theophilus Crate

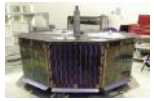


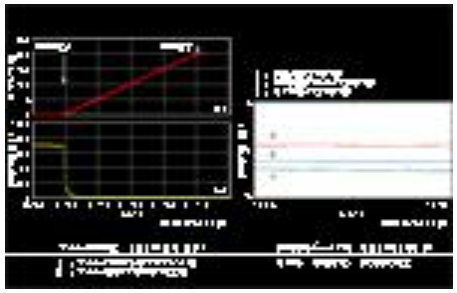
Gravity anomaly map



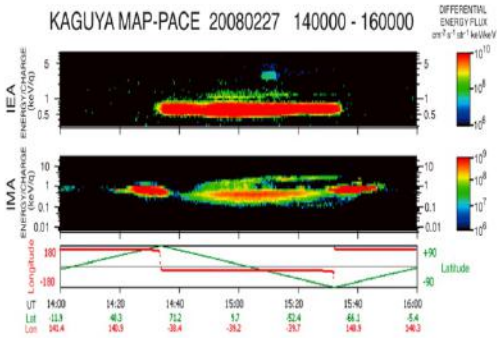
Signals from sub-satellites

Major Results of Mission Instruments (3/3)

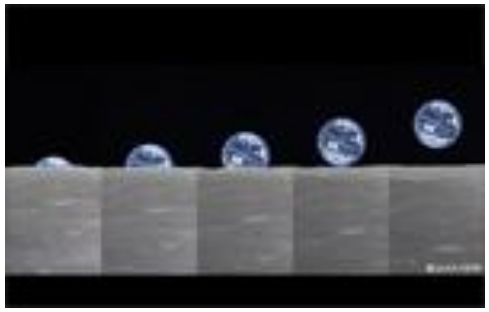
Instruments	Major Results
Lunar Magnetometer 	Magnetic field was measured as planned.
Plasma Energy Angle and Composition Experiment 	Plasma environment surrounding the Moon was measured as planned.
Charged Particle Spectrometer 	Cosmic radiation (electron and proton) and alpha particles from the Moon surface were measured. Cosmic ray telescope (heavy ions) did not work.
Radio Science 	Surface electrons were detected as expected.
Upper-Atmosphere and Plasma Imager 	Earth plasma environment was observed as planned. Gimbals had limited capability since last June.
High Definition TV Camera 	Earth and lunar surface were observed as planned.



Initial magnetic field data



Energy spectrum of solar wind ions



Full earth-rise

Summary - Nominal Mission Phase

1. *"Kaguya" spacecraft was operated almost perfectly.*
2. *Most of mission instruments worked as planned, achieving the observation goal for mineral composition, surface and subsurface structure, gravity field, magnetic field, and lunar environment.*
3. *The observation goal for element abundance was achieved by adding the data obtained in the extended mission phase.*
4. *It is concluded that the mission success criteria was achieved, but the scientific achievement of the mission depends on the scientists' efforts on the data analysis hereafter.*