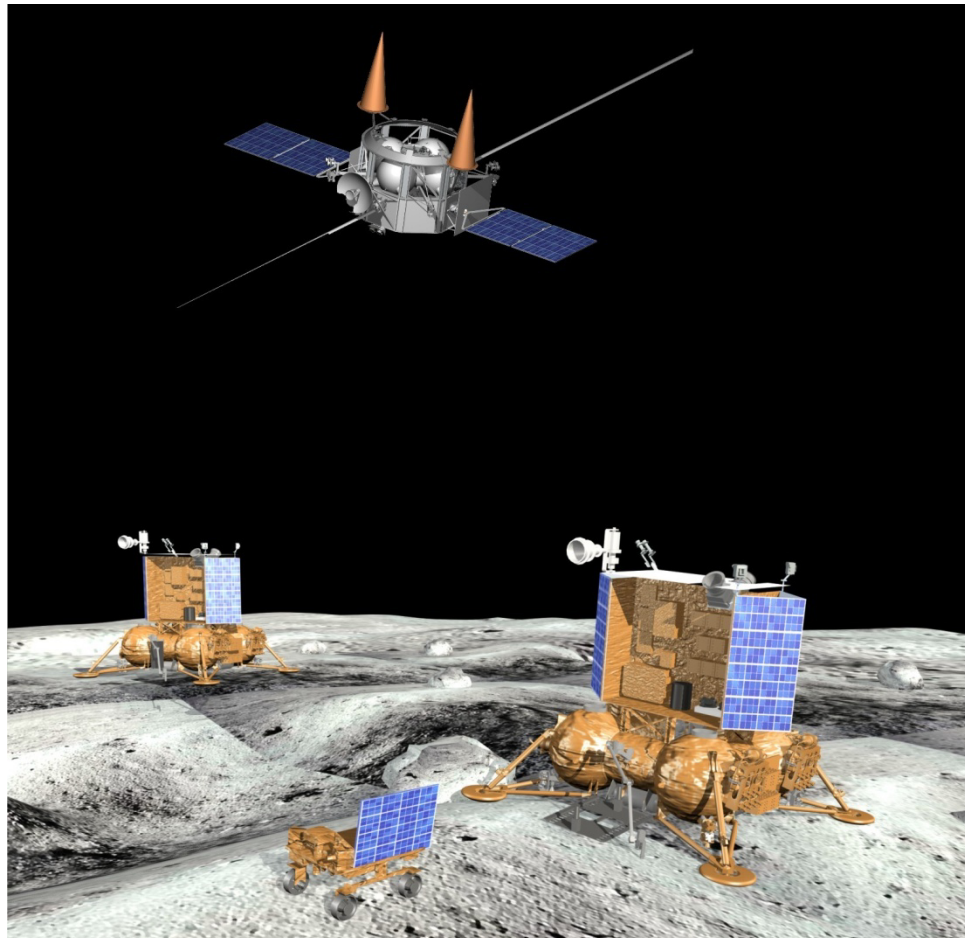


FEDERAL SPACE AGENCY
LAVOCHKIN ASSOCIATION

"LUNA-GLOB" AND "LUNA-RESOURCE" SPACECRAFT

V. Dolgoplov, O. Zaitseva, M. Martynov, V. Khartov



Space Research Institute

January 25-27, 2011



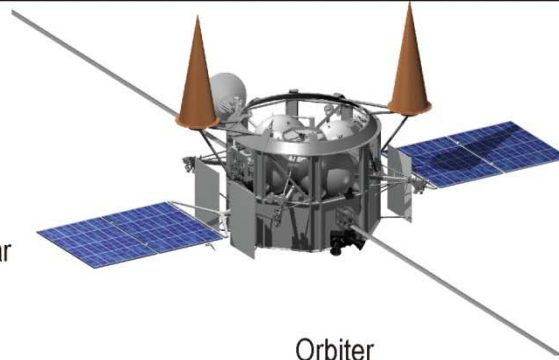
"LUNA-GLOB" AND "LUNA RESOURCE" MISSIONS



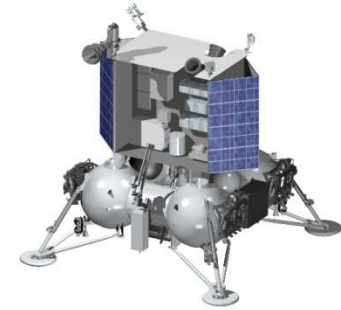
LUNAR MISSIONS INCLUDED INTO THE FEDERAL SPACE PROGRAM-2015

Luna-Glob:

Remote sensing from lunar orbit;
In-situ studies in the near-polar area of the Moon;
Natural resources survey;
Study of influence of incoming corpuscular fluxes and e-field radiation on the Moon
(single-launch mission)



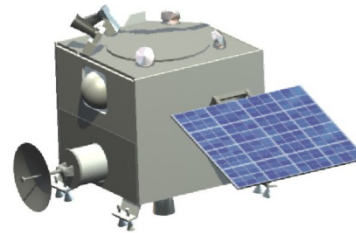
Orbiter



Lander

Luna-Resource:

In-situ studies in the near-polar area using stationary surface station in the framework of russian-indian joint project
(single-launch mission)



Orbiter (India)



Lander (Russia)
with Mini-rover (India)

Moon Sample Return:

Studies in the near-polar area by multi-functional lunar rover, soil samples collection and delivery to the Earth
(dual-launch mission)



Lander with Moon rover

Landing mission

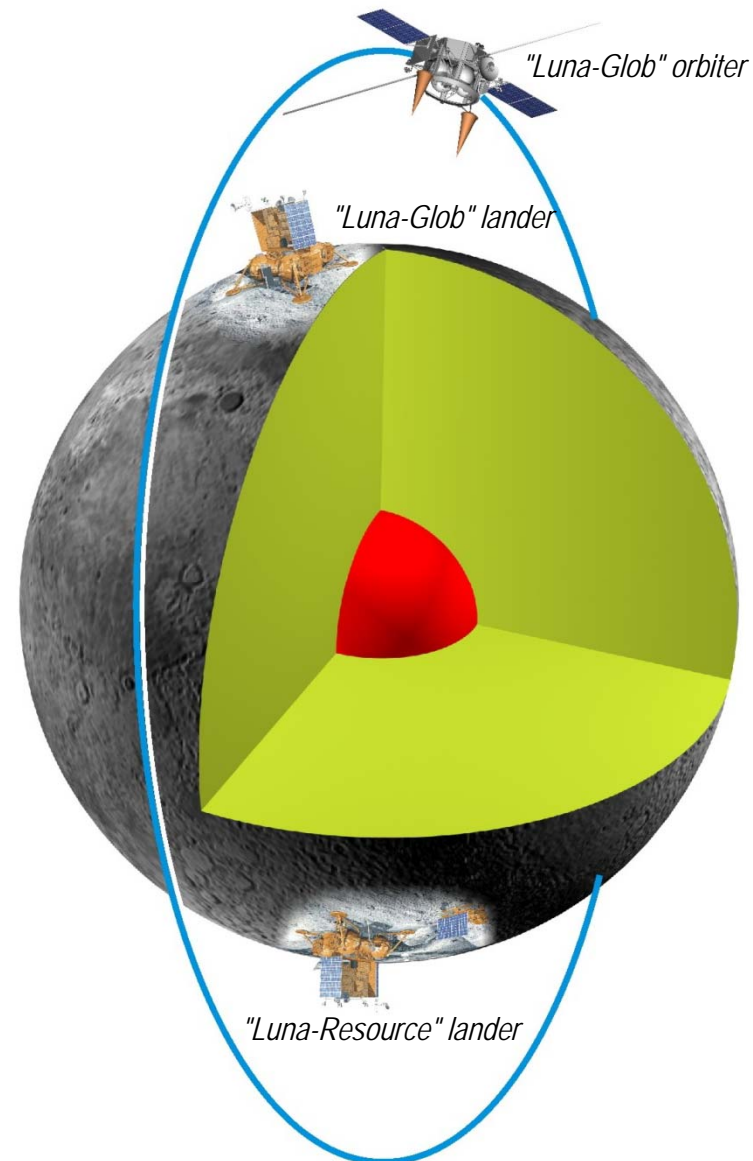


Lander with
Lunar ascent vehicle

Landing-return mission



"LUNA-GLOB" AND "LUNA RESOURCE" MISSIONS



Parameter	"Luna-Glob" mission	"Luna-Resource" mission
Landing area	North Pole	South Pole
Launch date	2014	2013
Orbiter mass	1630 kg	-
Lander mass	1260 kg	1260 kg
Mass of scientific equipment on the orbiter	120 kg	-
Mass of the scientific equipment on the lander	50 kg	34 kg
Mass of the soil sampling device	12 kg	-



"LUNA-RESOURCE" MISSION



FUNDAMENTALS

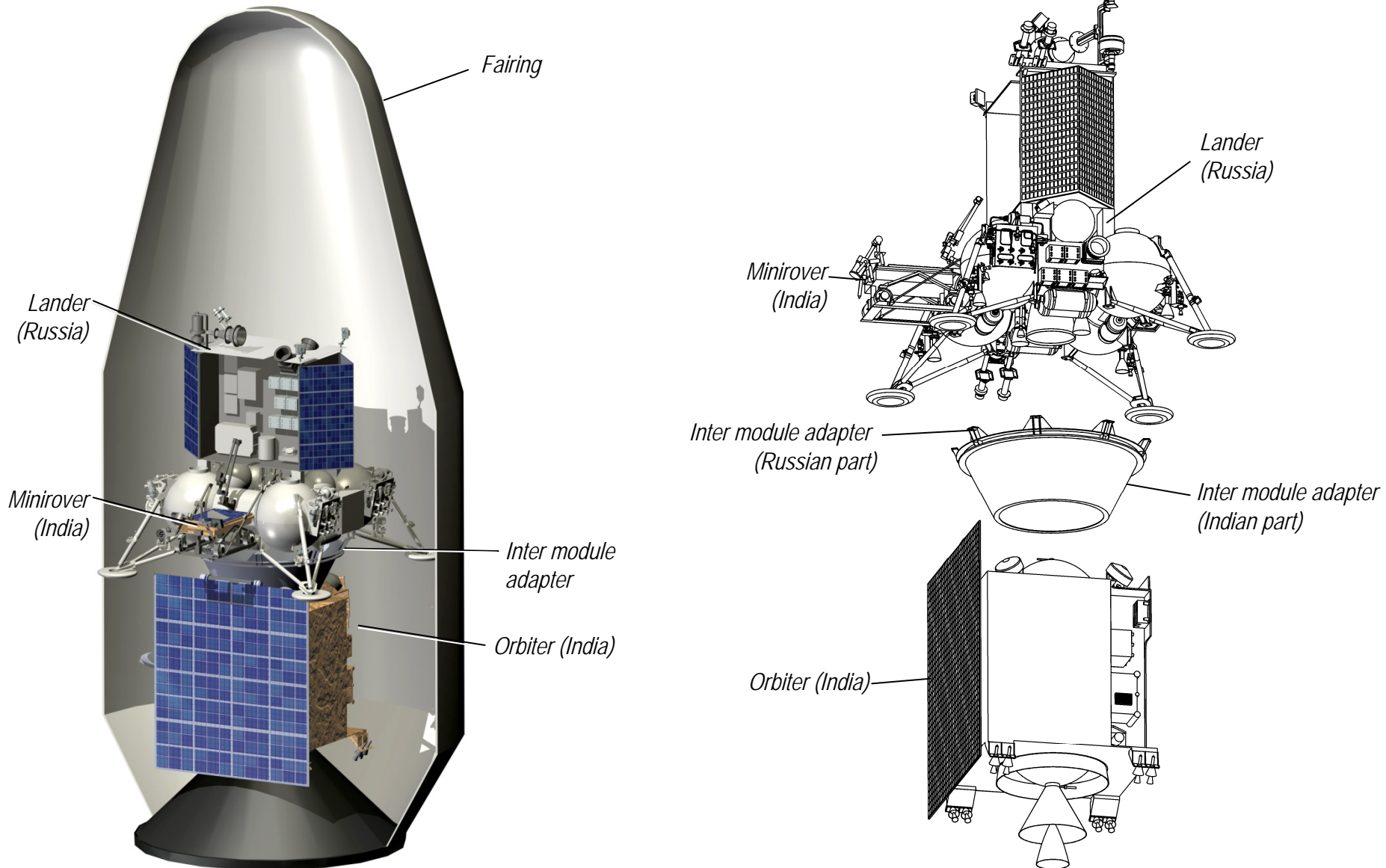
1. Main scientific goal – contact investigations in the South Pole area of the Moon.
2. Launcher – GSLV Mk-II (India).
3. Mission elements/ integrated spacecraft:
 - orbiter "Chandrayaan-2" (India);
 - lander with stationary surface station (Russia) and minirover (India);
 - inter module adapter (Russia, India).
3. Launch of the integrated spacecraft – September 2013, Satish Dhawan Space Centre (SDSC), SHAR (India).
4. Parking orbit provided by the launcher – near-Earth orbit ($H_p=170$ km, $H_a=37\ 000$ km, $i=44^\circ$).
5. Injection into the Lunar transfer trajectory – provided by the orbiter "Chandrayaan-2".
6. Concept of communication:
 - lander - Earth communication – direct (X-band);
 - minirover – Earth – via lander (S-band).
7. Mission duration – 1 year.
6. Initial mass of the lander – 1 260 kg, including:
 - lander with stationary surface station – 1 210 kg;
 - scientific equipment – 35 kg;
 - minirover – 15 kg.



"LUNA-RESOURCE" MISSION



INTEGRATED SPACECRAFT

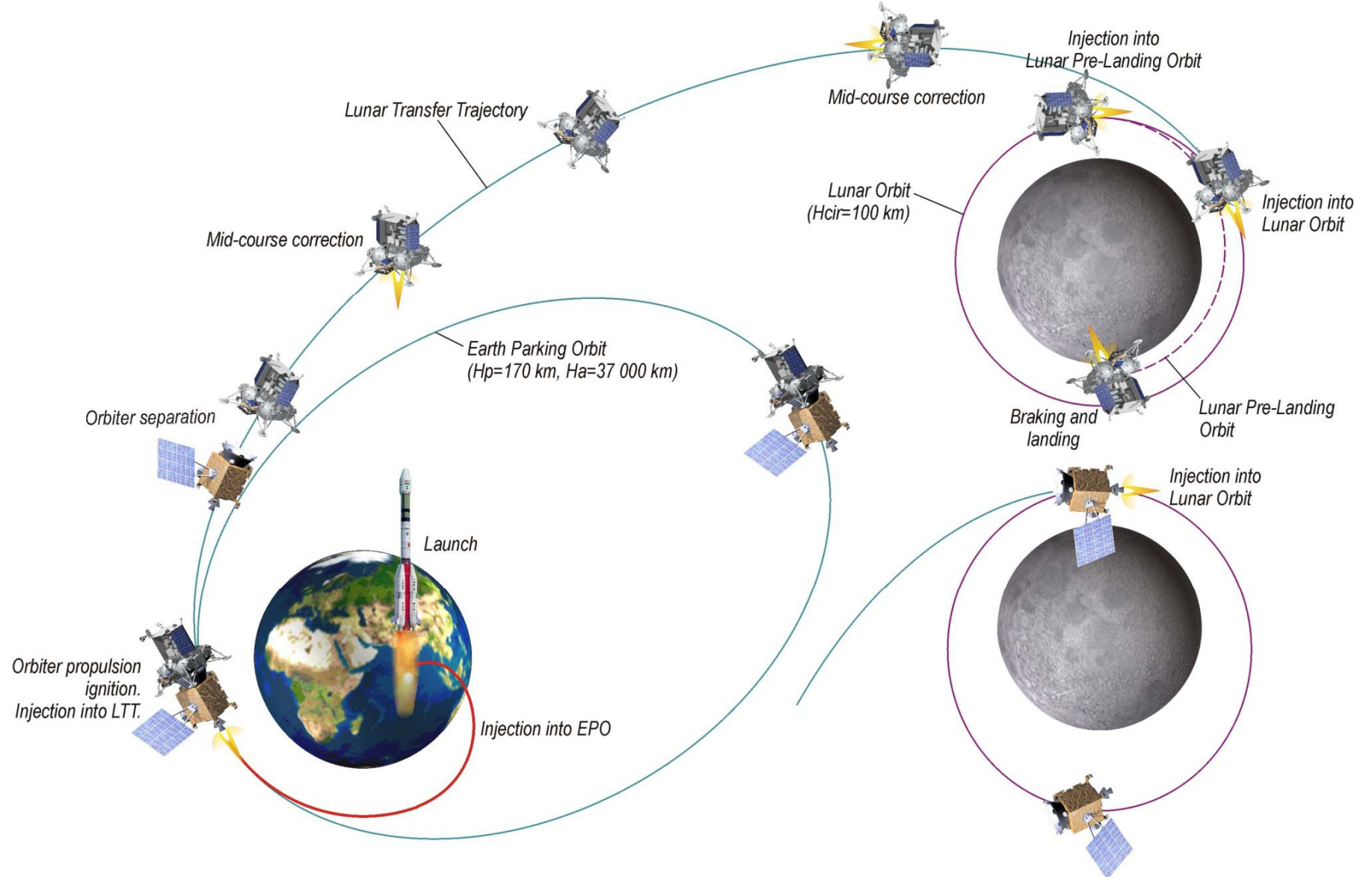




"LUNA-RESOURCE" MISSION



"LUNA-RESOURCE" MISSION PROFILE

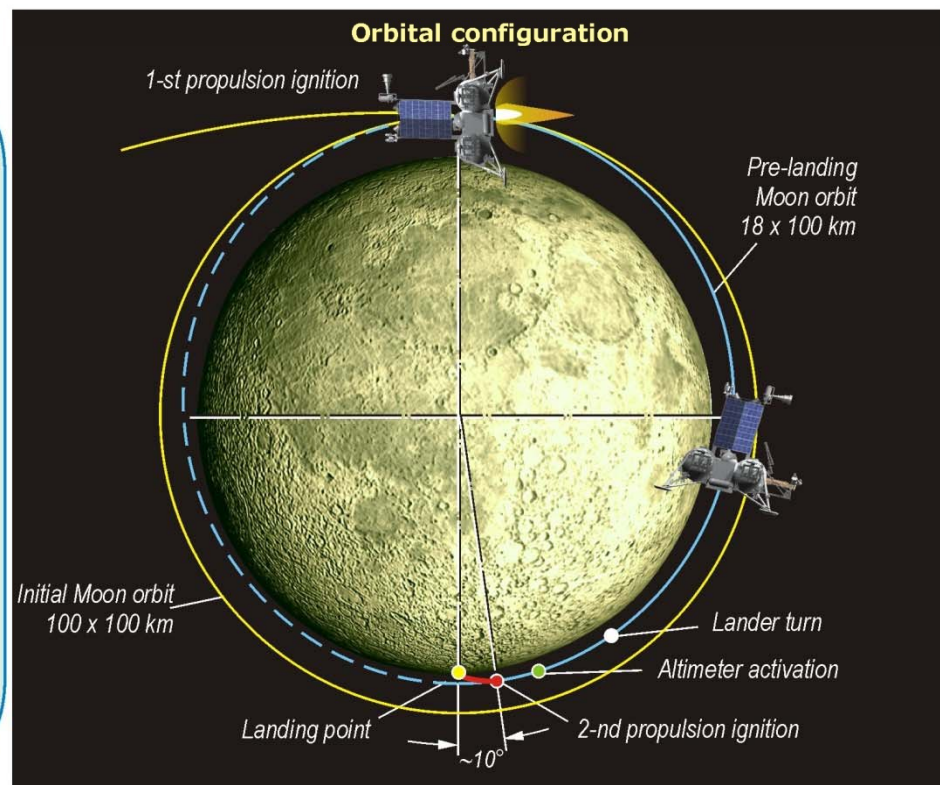
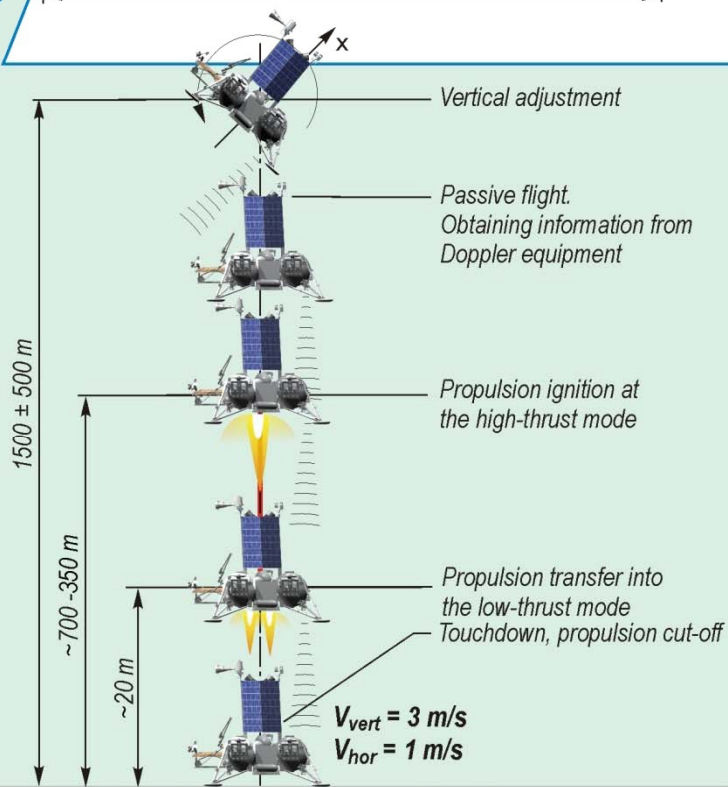
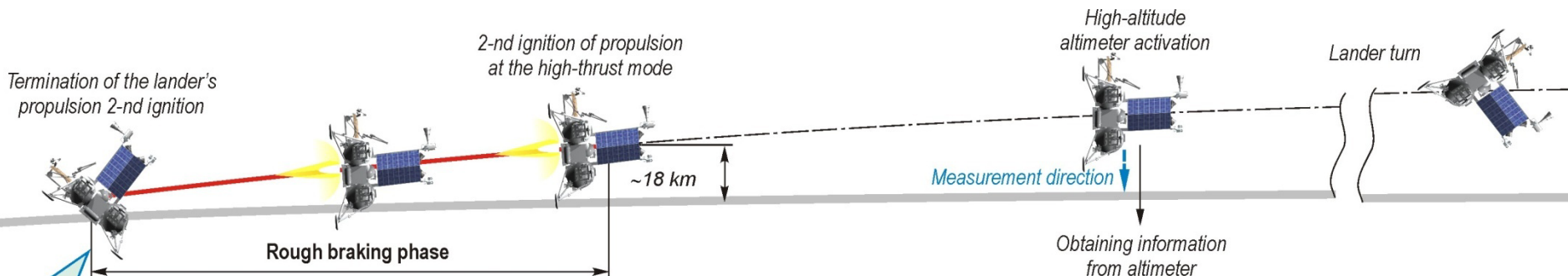




"LUNA-RESOURCE" MISSION



"LUNA-RESOURCE" LANDER DESCENT PROFILE

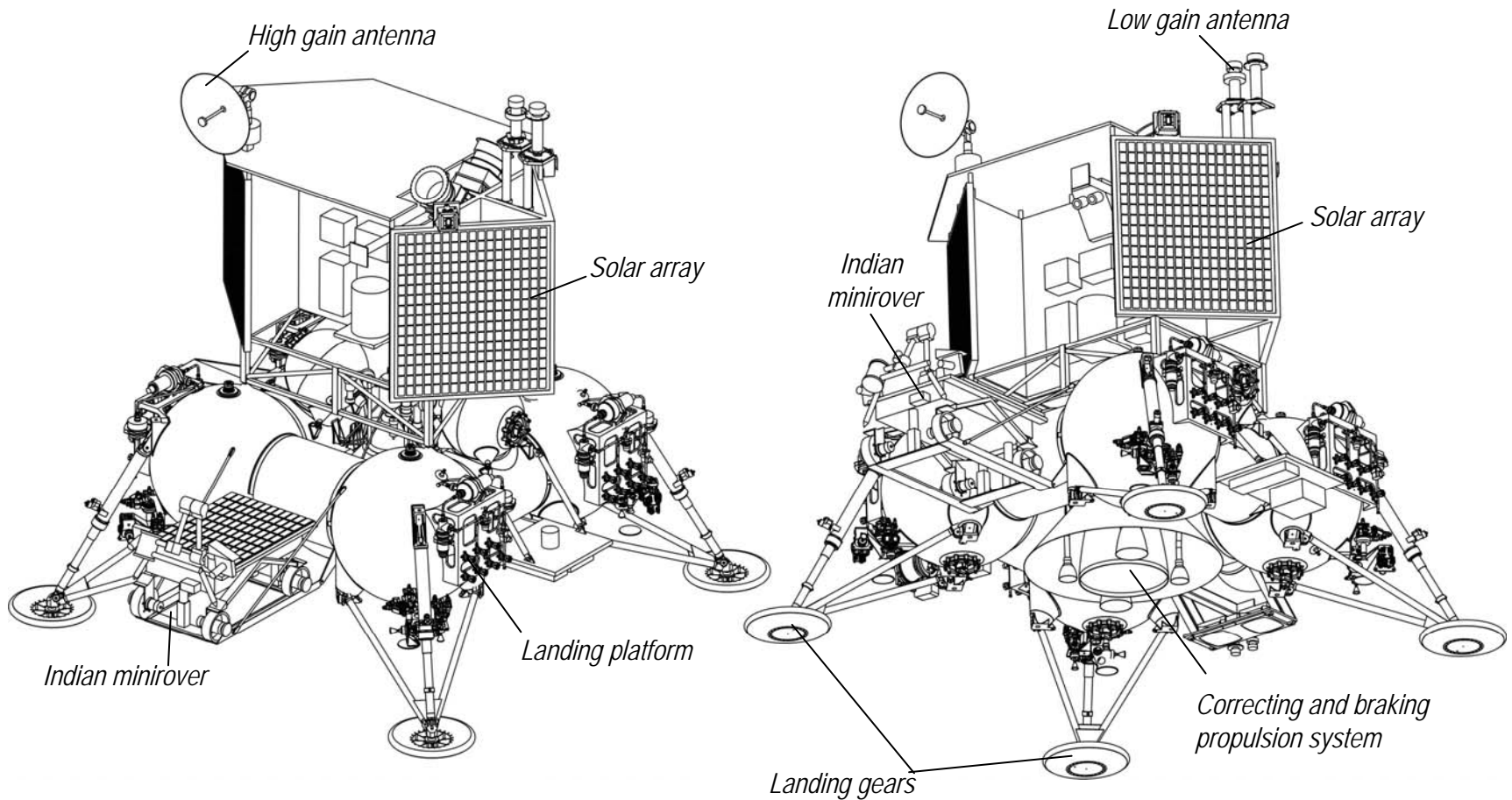




"LUNA-RESOURCE" MISSION



LANDER





"LUNA-GLOB" MISSION

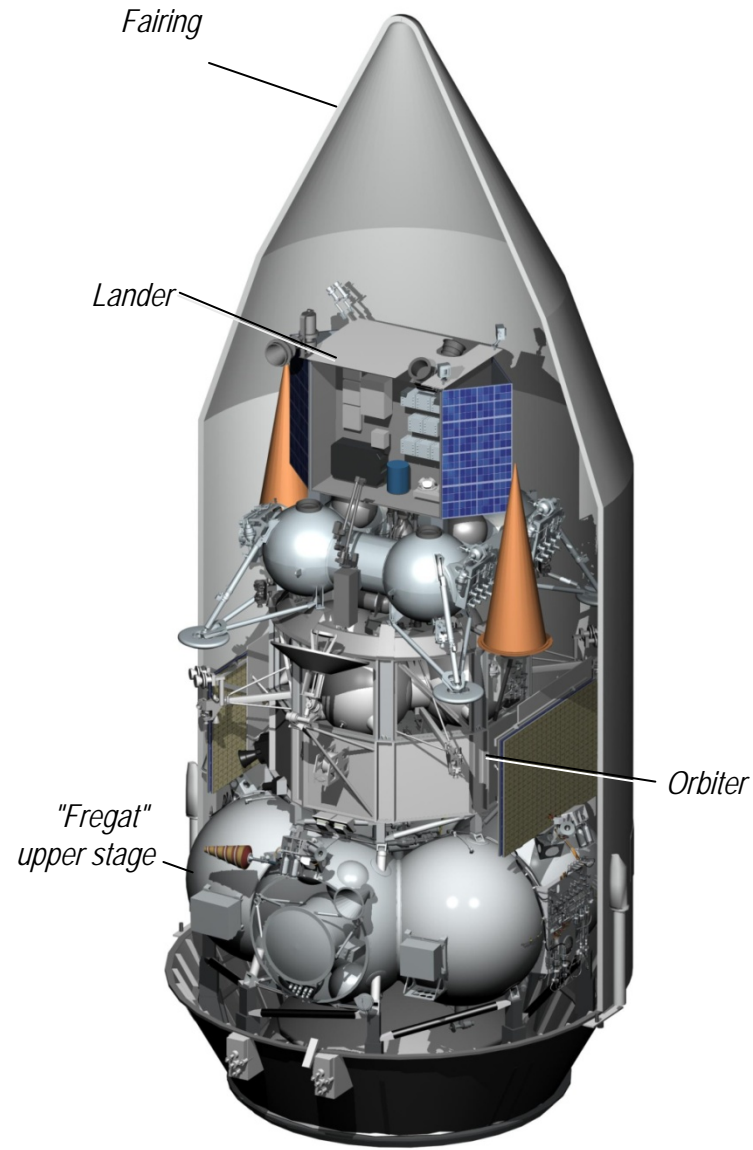


FUNDAMENTALS

1. Main scientific goal – investigation of the Moon by remote and contact methods in the North Pole area.
2. Launcher – "Soyuz-2-1b".
3. Mission elements:
 - orbiter;
 - lander with the surface stationary station.
3. Spacecraft launch – 2014, Baikonur launch site.
4. Mission duration:
 - orbiter – 3 years;
 - lander – 1 year.
8. Initial mass:
 - orbiter mass – 1 630 kg;
 - lander mass – 1260 kg.
9. Mass of scientific equipment:
 - on the orbiter – 120 kg;
 - on the lander – 50 kg.



"LUNA-GLOB" MISSION



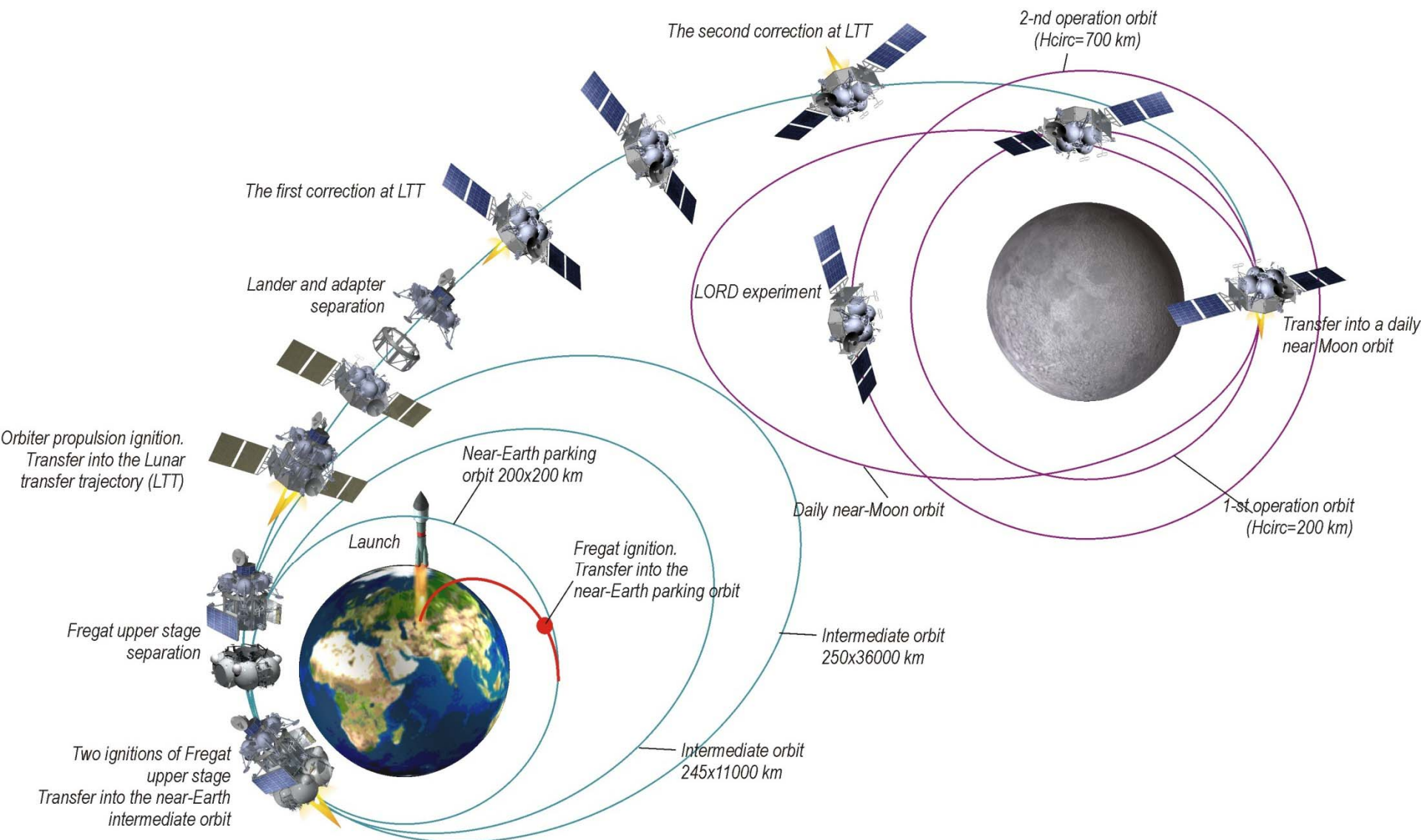
Launcher	"Soyuz-2/1b" Launcher "Fregat" upper stage
Launch year	2014
Spacecraft composition	<ul style="list-style-type: none">• Orbiter• Lander
Spacecraft mass	2 967 kg
Orbiter mass	1 657 kg
Lander mass	1 260 kg
Lander communication with the Earth	Directly to the Earth
Mass of scientific equipment on the orbiter	120 kg
Mass of scientific equipment on the lander	50 kg



"LUNA-GLOB" MISSION



"LUNA-GLOB" ORBITER MISSION PROFILE

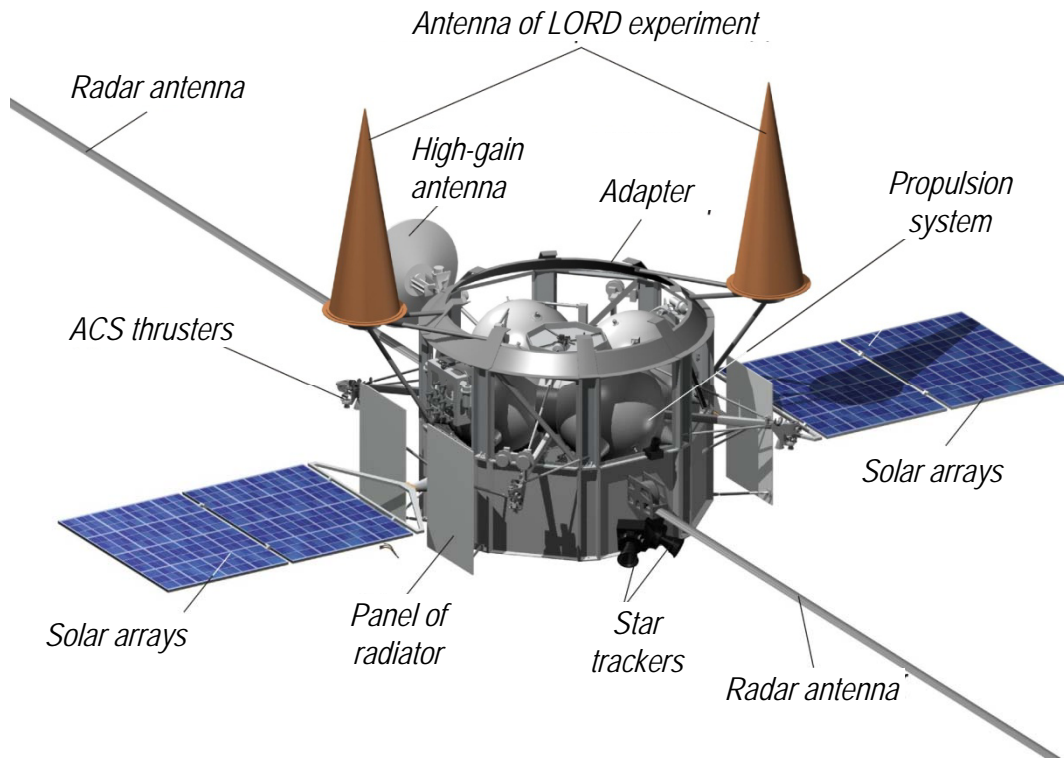




"LUNA-GLOB" MISSION



ORBITER



LANDER

