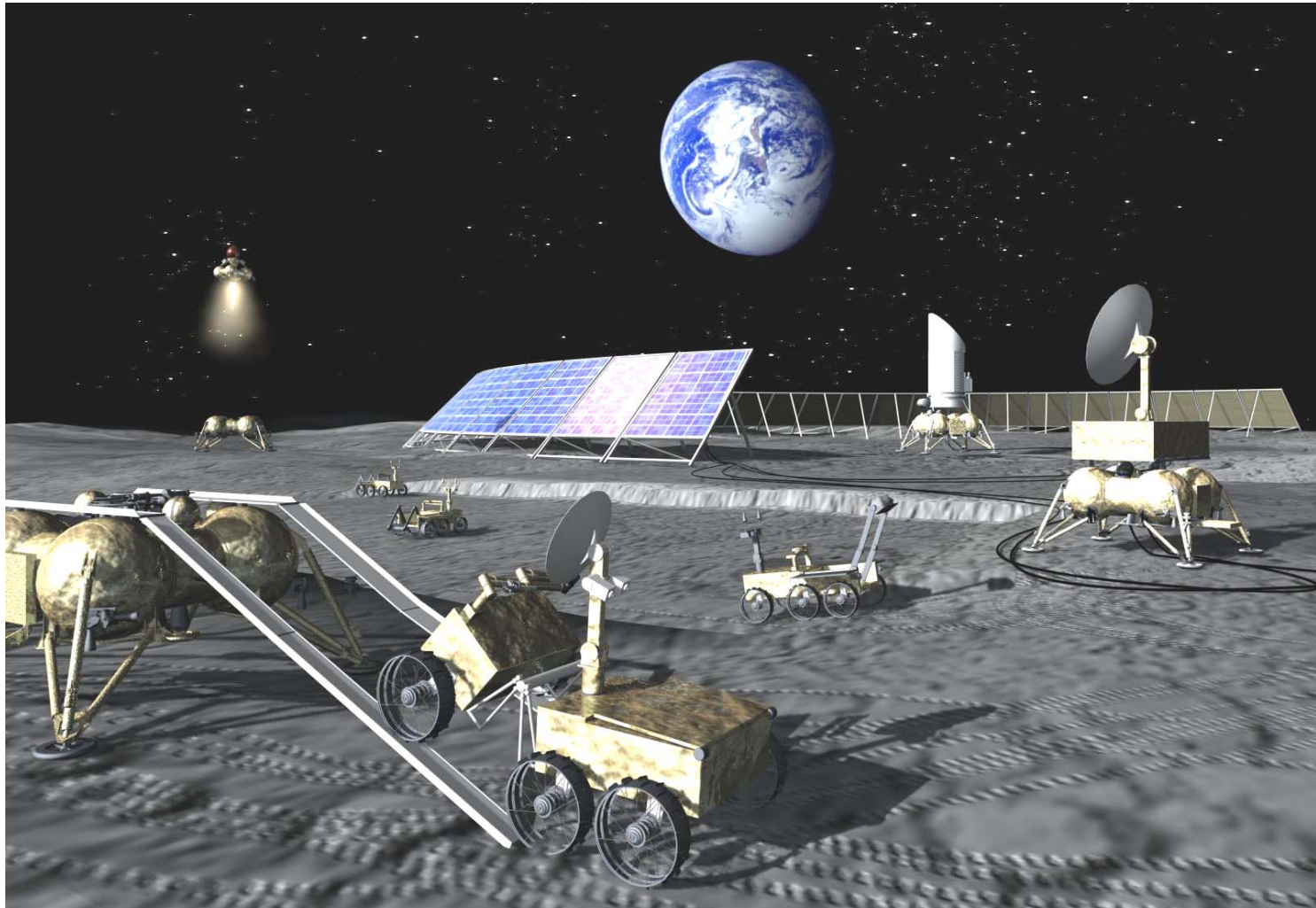


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES





PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



CONCEPT

1. The program foresees development of automatic space complexes for the following phases of the Moon exploration and development:
 - exploration of the Moon internal structure and prospecting of natural resources by means of remote and contact methods;
 - contact explorations in the near-pole area of the Moon by means of a moon rover;
 - delivery to the Earth of soil samples collected with the help of the moon rover;
 - creation of a scientific-research base on the Moon surface for development of basic methods of the moon soil processing, delivery of obtained samples and materials to the Earth and also carrying out of a wide spectrum of scientific and technological researches.
2. Realization of the main program phases is planned within the period 2010-2015.
3. The tasks of the first two phases are intended to be solved in the frame of the “Luna-Glob” Project, which is the part of Russian Federal Space Program. Within the project it is proposed to realize two missions: an orbital mission and a landing one. Landing mission with the moon rover is a part of an international project. Use of technical decisions of 'Phobot-Ground" project allows to launch to first mission in 2010.
4. Missions of the third and the fourth phases can be realized within the framework of international cooperation, which potential will increase during next decade as scope of the Moon explorations by other countries will increase.



PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



Phase 1:

- investigation of the Moon internal structure;
- natural resources exploring;
- investigation of the near-Moon environment.

"Luna-Glob" project



Orbital mission



"Phobos-Grunt" project

Phase 2:

Contact investigations in the Lunar Polar area



Landing mission with rover

Phase 3:

Lunar sample return

"Luna-Grunt" project



Rover mission



Return mission

Phase 4:

Deployment of the robotic proving ground with scalable architecture



Rover missions



Return missions

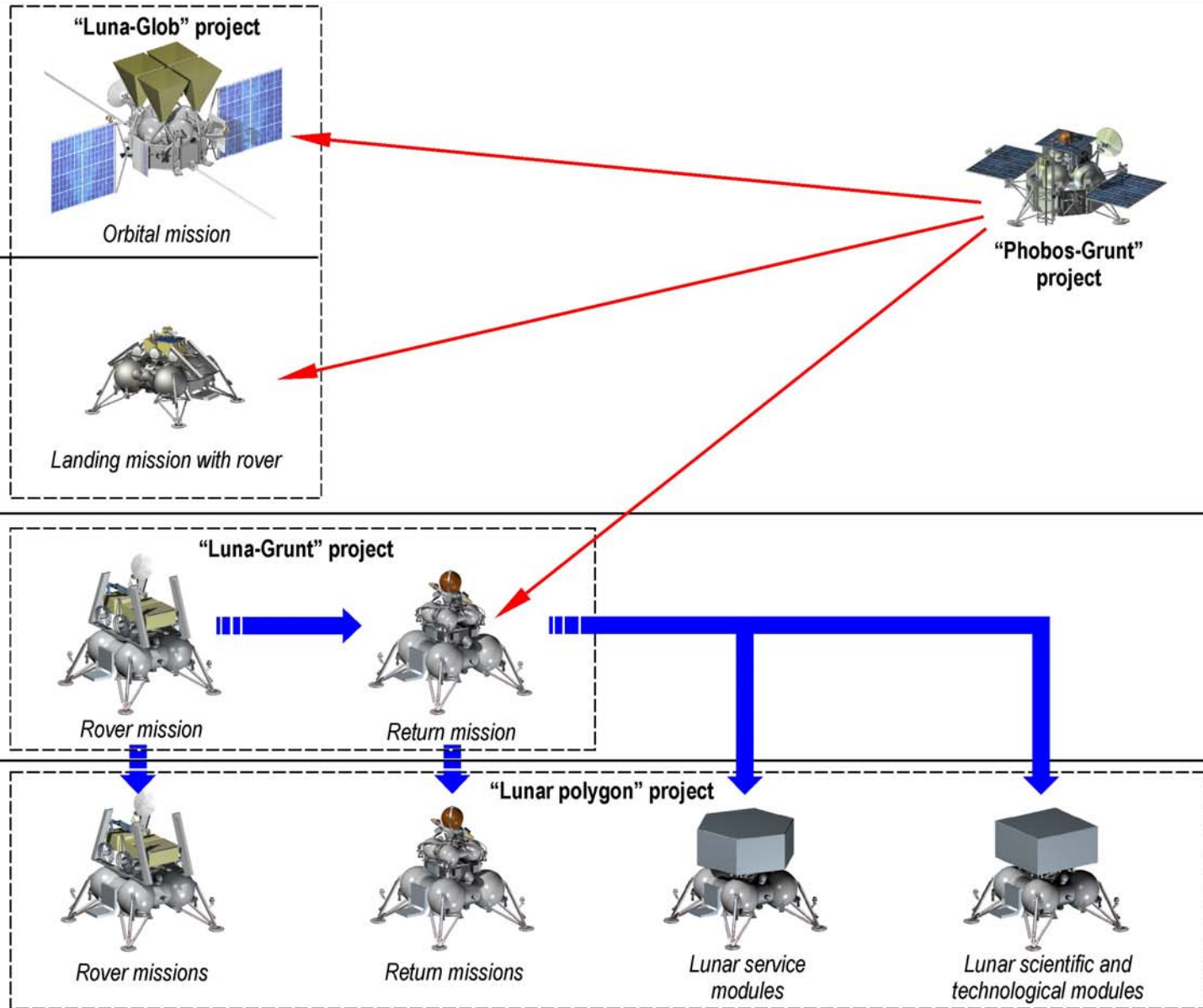


Lunar service modules



Lunar scientific and technological modules

"Lunar polygon" project





PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GLOB” PROJECT (1-st phase: orbital mission)



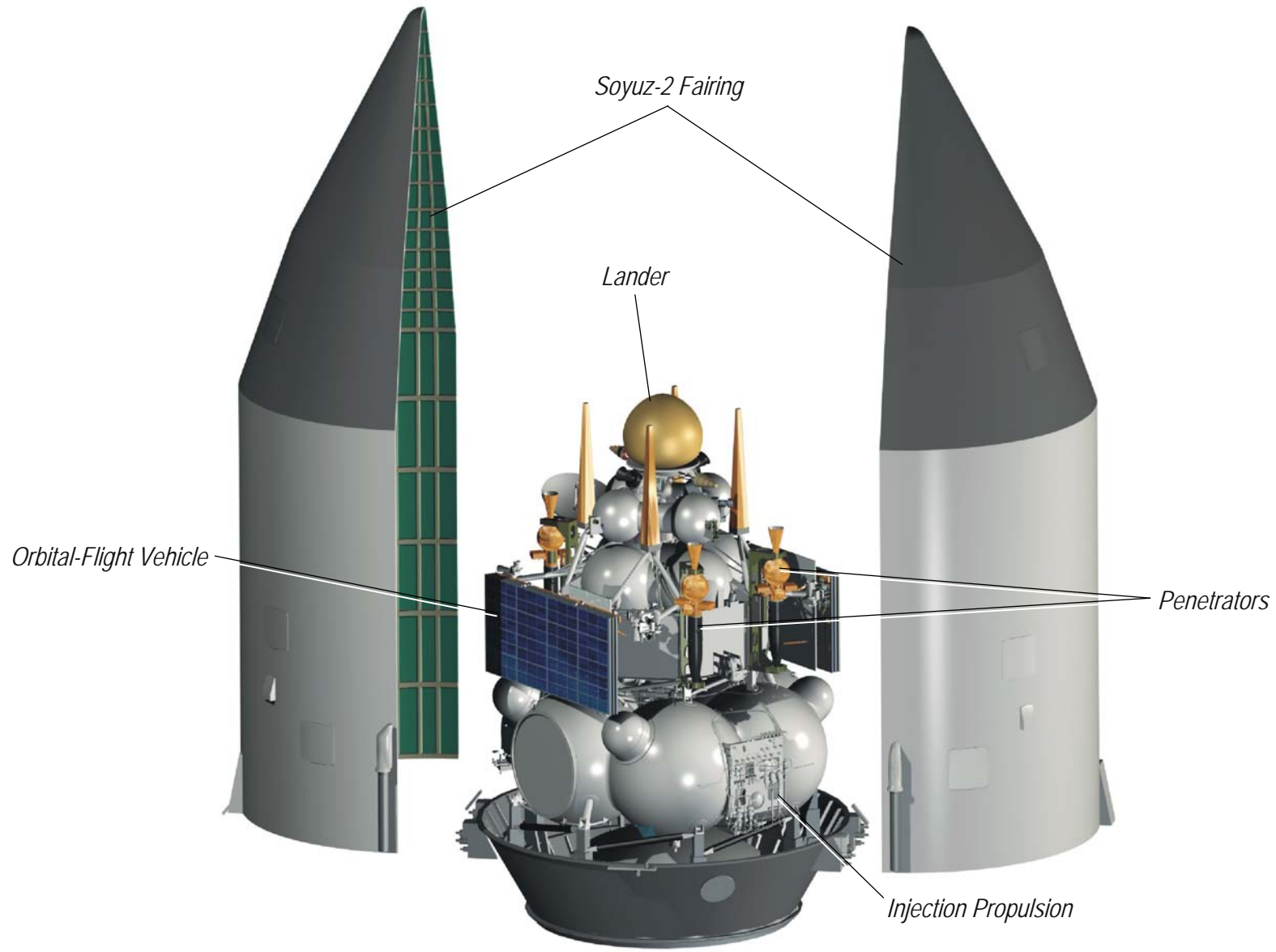
Scientific tasks	Study of the Moon internal structure, prospecting of natural resources and exploration of space rays
Launch year	2012 (2010 TBC)
Launcher	Soyuz-2
Spacecraft composition	<ul style="list-style-type: none">– Injection Propulsion– Orbital-flight Vehicle– Lander with a Polar Station– Penetrators
Spacecraft mass: <ul style="list-style-type: none">– at launch– on Lunar Transfer Trajectory	<ul style="list-style-type: none">8120 kg2320 kg
Orbiter payload mass	120 kg



PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GLOB” PROJECT (1-st phase: orbital mission)

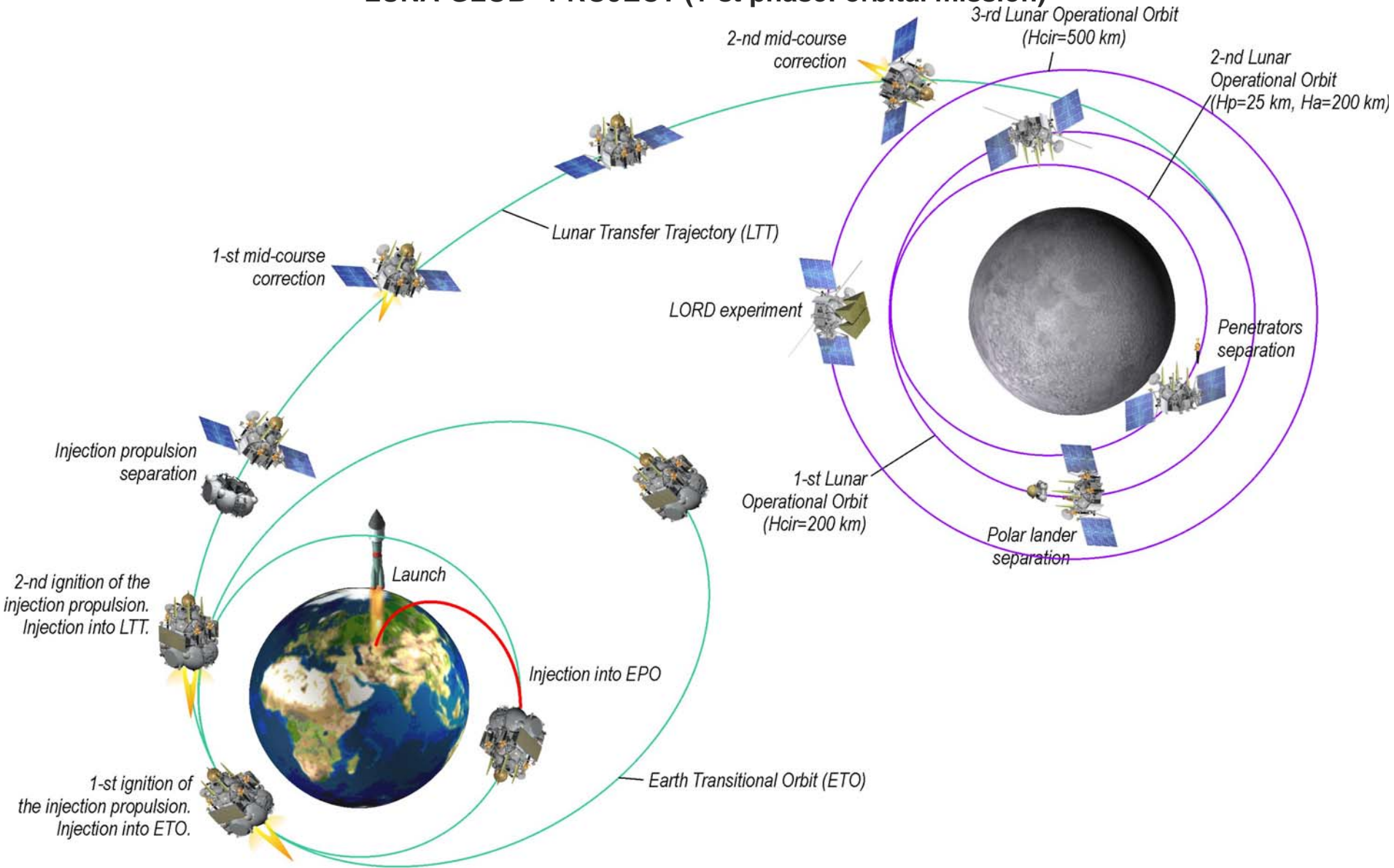




PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GLOB” PROJECT (1-st phase: orbital mission)

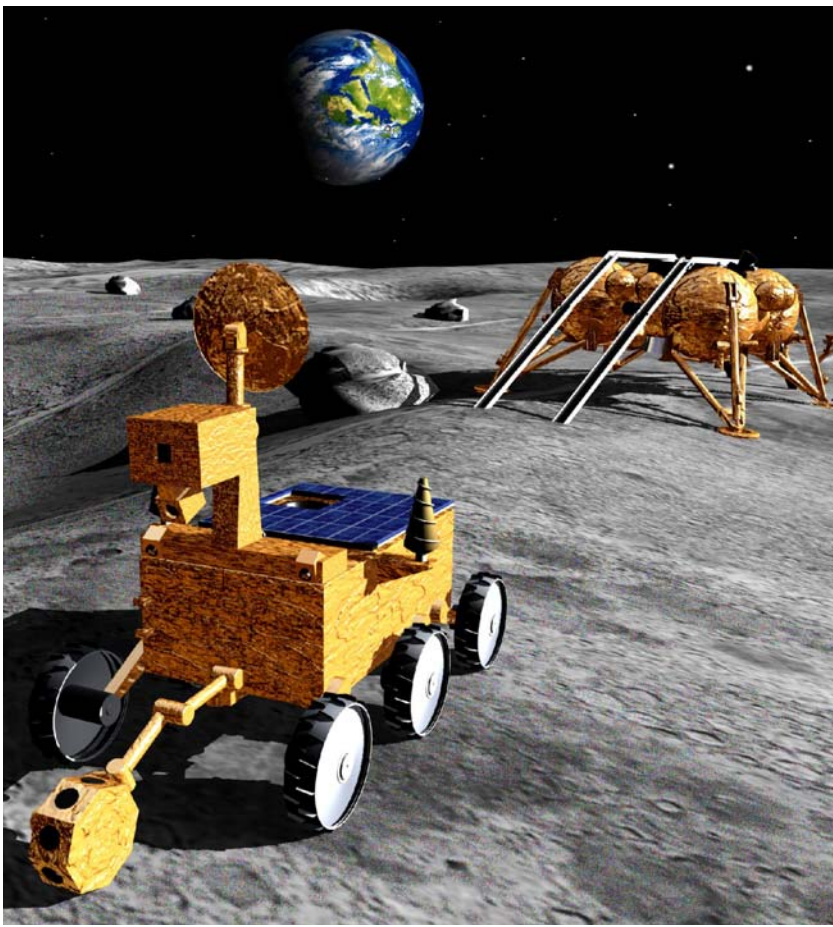




PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GLOB” PROJECT (2-nd phase: mission with a Polar Moon Rover)



Scientific tasks	Contact in-situ investigations in the near Pole region of the Moon
Launch year	2011-2012 (TBC)
Spacecraft composition	– Landing Module – Moon Rover
Spacecraft mass	1100 kg
Rover mass	50 kg
Rover lifetime	1 year

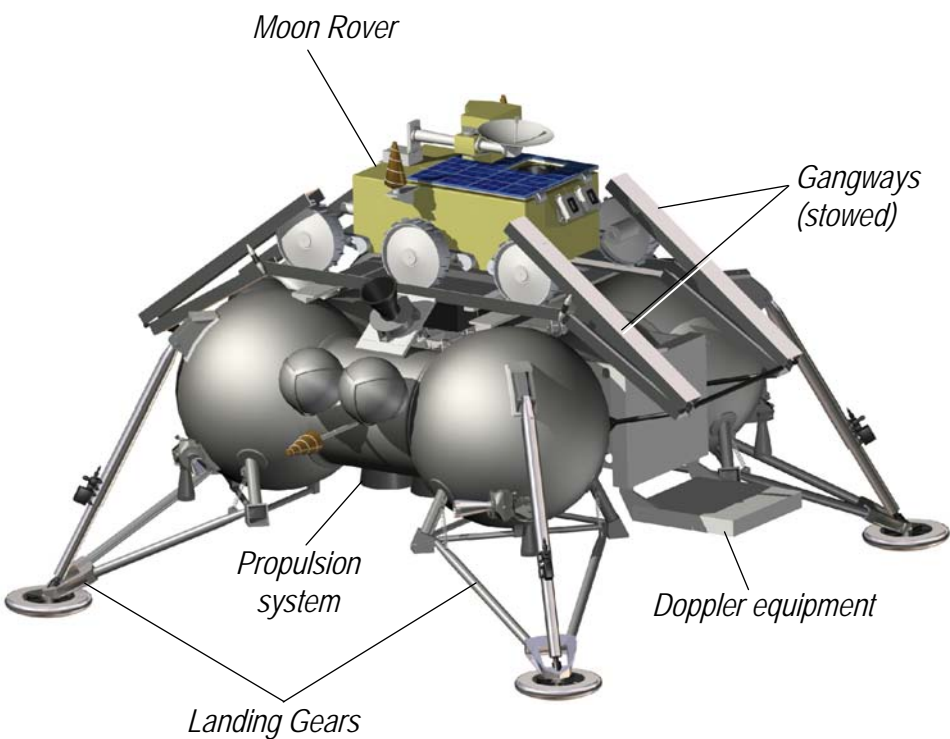


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES

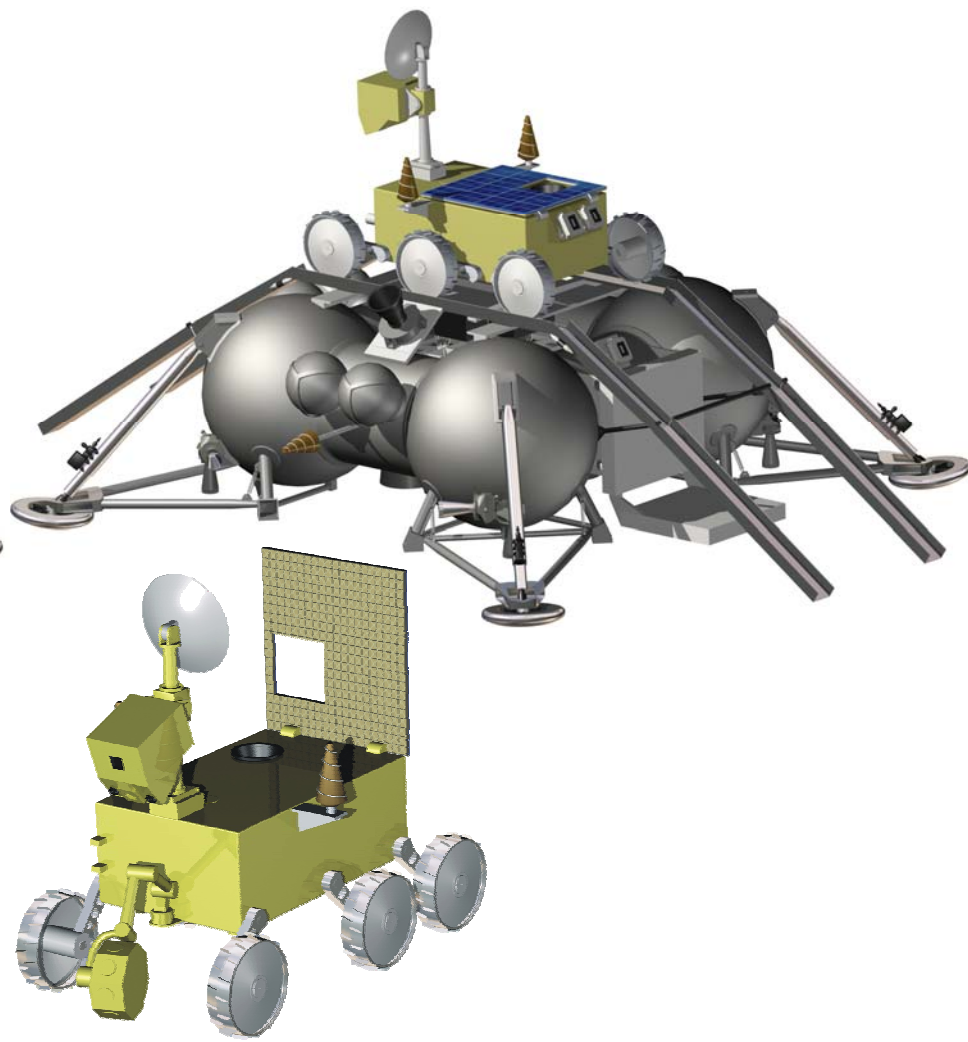


“LUNA-GLOB” PROJECT (2-nd phase: mission with a Polar Moon Rover)

SC launch configuration



SC on-surface configuration

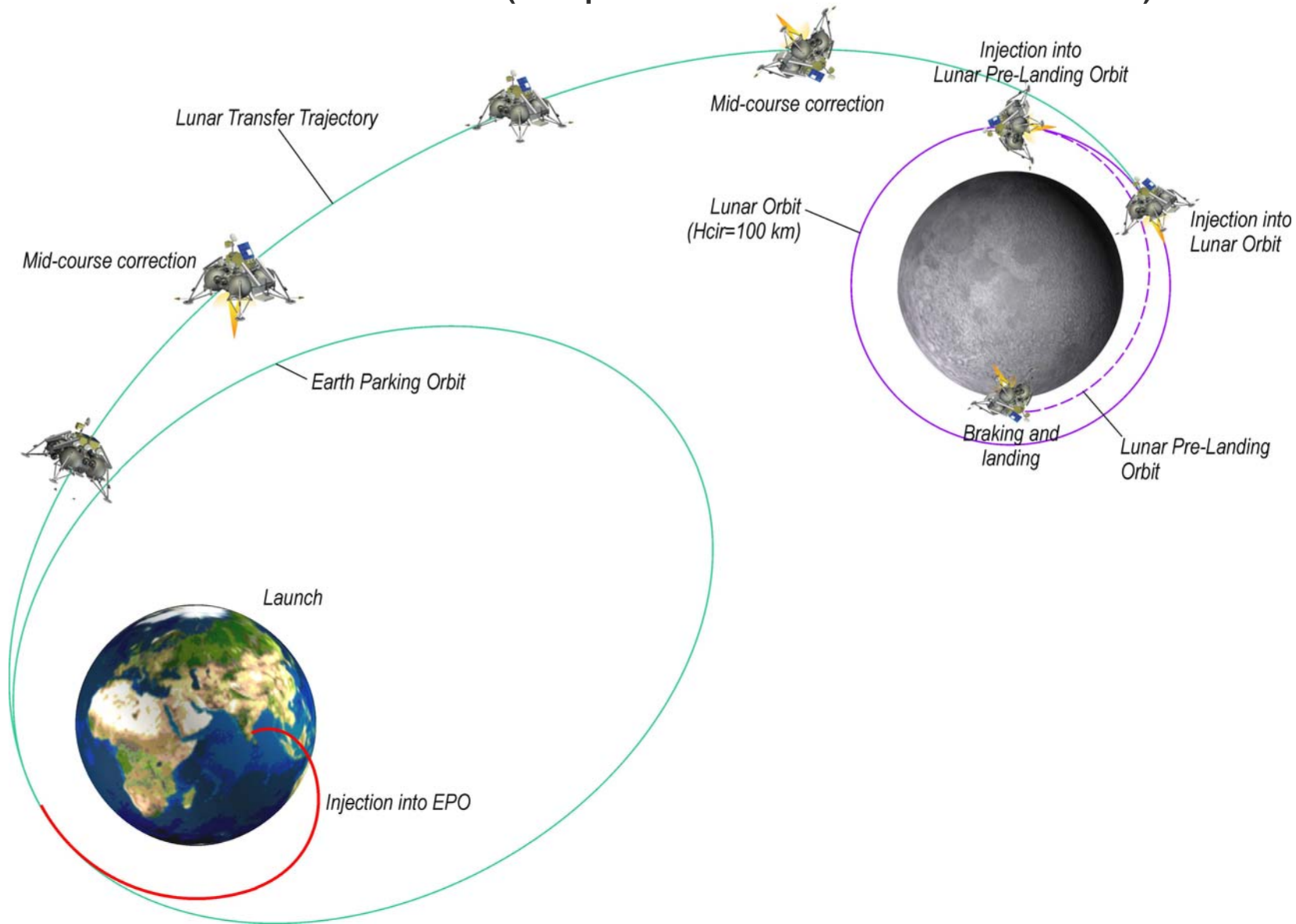




PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GLOB” PROJECT (2-nd phase: mission with a Polar Moon Rover)

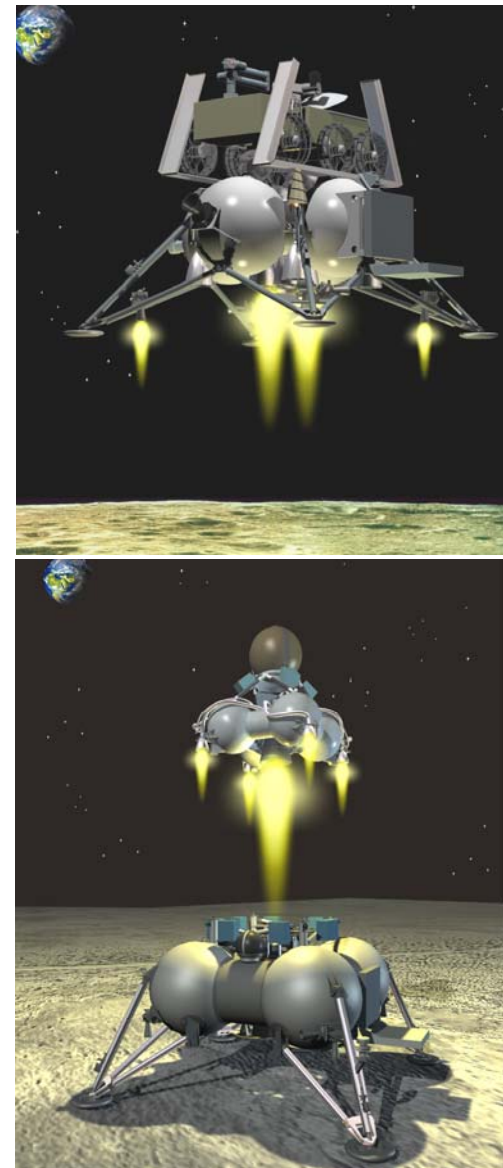




PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNA-GRUNT” PROJECT (Lunar samples return mission)



	Mission with a Moon Rover	Mission with an Ascent Vehicle
Scientific tasks	Contact investigations and collecting of the lunar soil samples	Delivery to the Earth of the lunar soil samples
Launch year	2014 (TBC)	2015 (TBC)
Launcher	Soyuz-2	Soyuz-2
Spacecraft composition	– Injection Propulsion – Orbital-Landing Vehicle – Moon Rover	– Injection Propulsion – Orbital-Landing Vehicle – Ascent Vehicle
Spacecraft mass: – at launch – during flight to the Moon	8120 kg 2320 kg	8120 kg 2320 kg
Mass of the moon rover	400 kg	-
Mass of the ascent vehicle	-	400 kg
Mass of the soil	up to 1 kg	

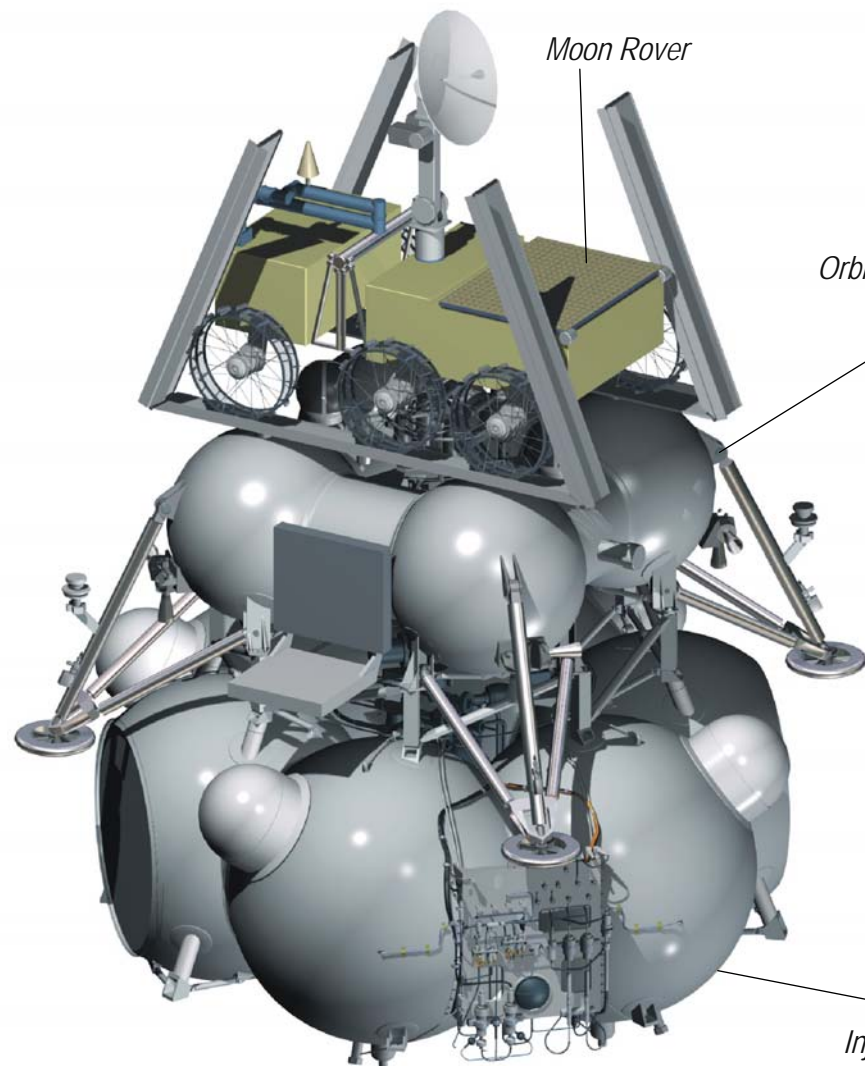


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES

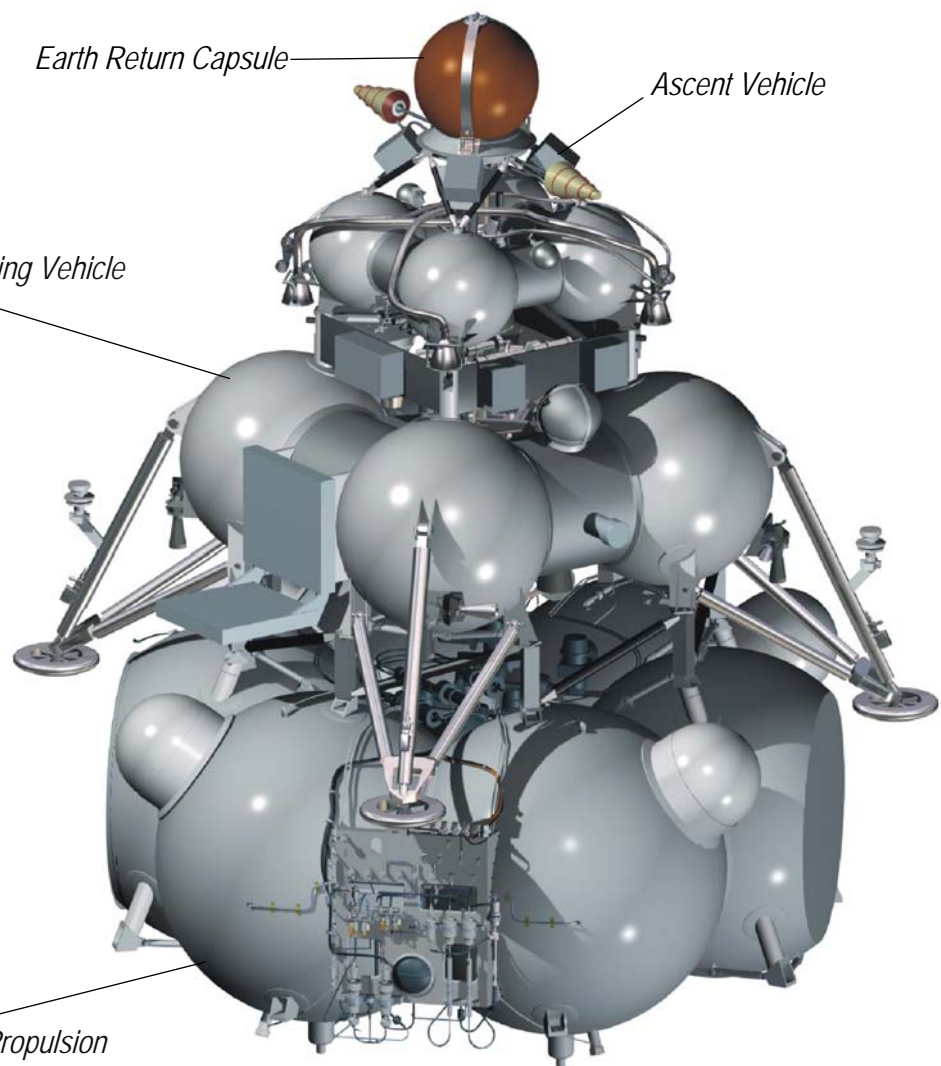


“LUNA-GRUNT” PROJECT (Lunar samples return mission)

SC with a Moon Rover



SC with an Ascent Vehicle



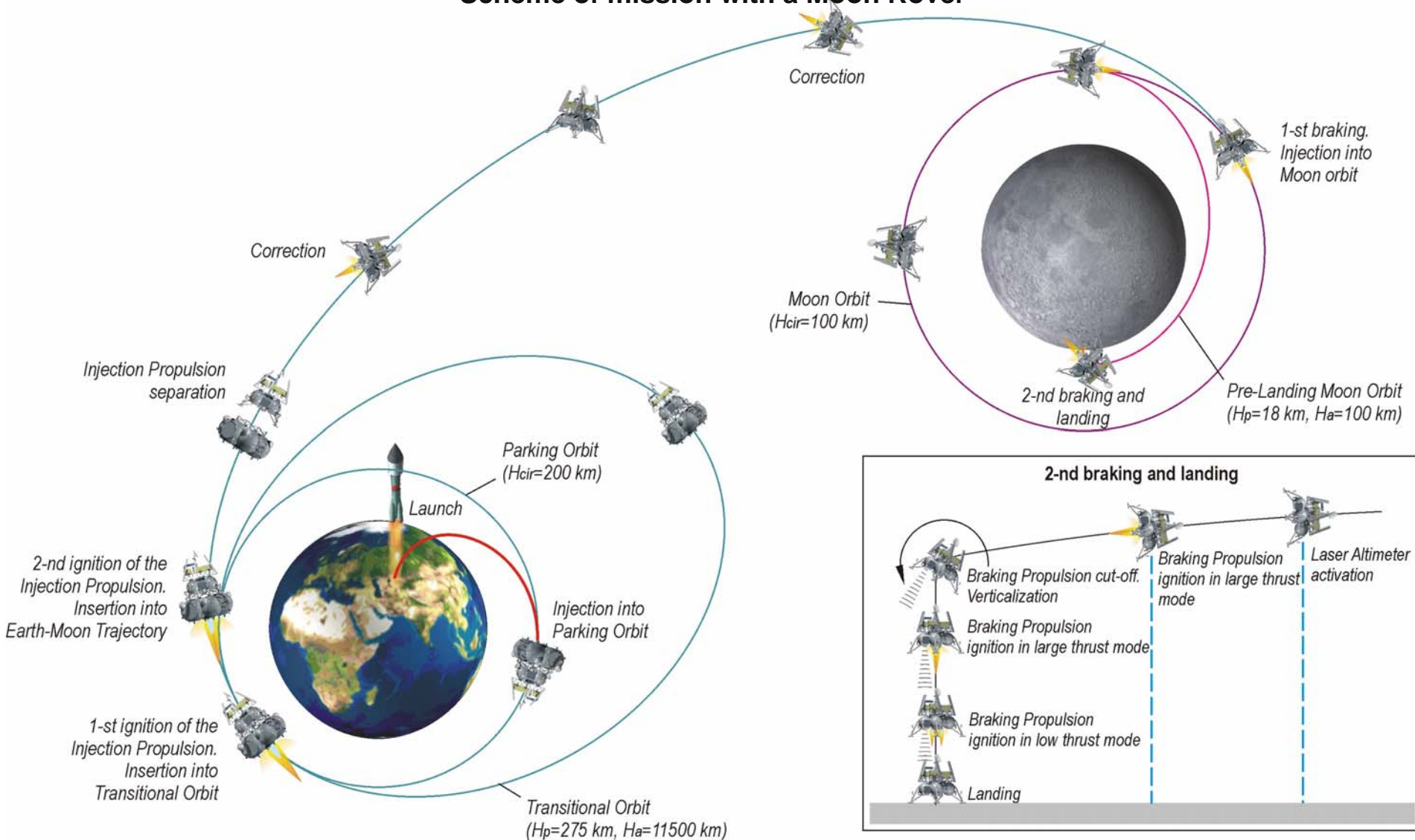


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



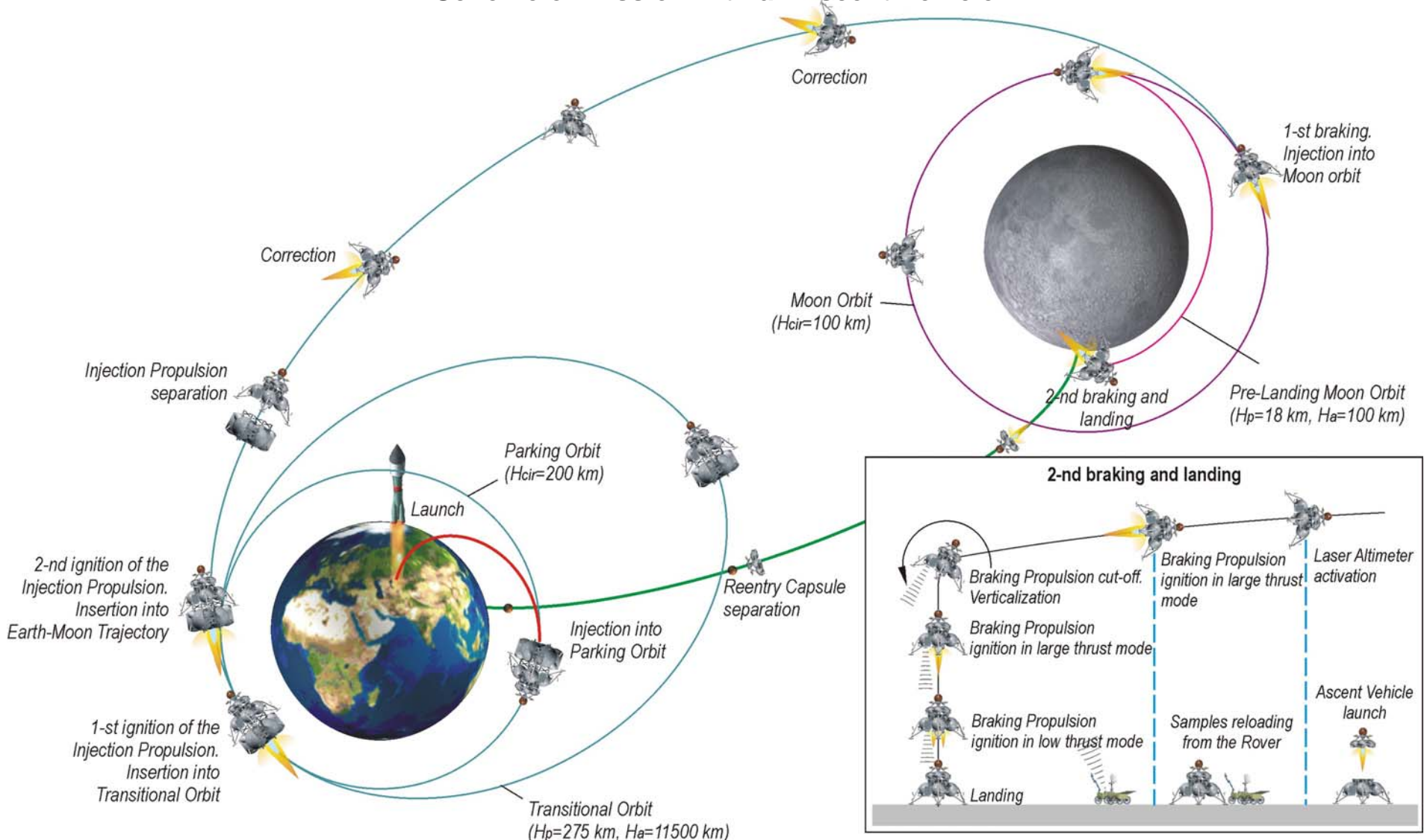
“LUNA-GRUNT” PROJECT (Lunar samples return mission)

Scheme of mission with a Moon Rover



“LUNA-GRUNT” PROJECT (Lunar samples return mission)

Scheme of mission with an Ascent Vehicle

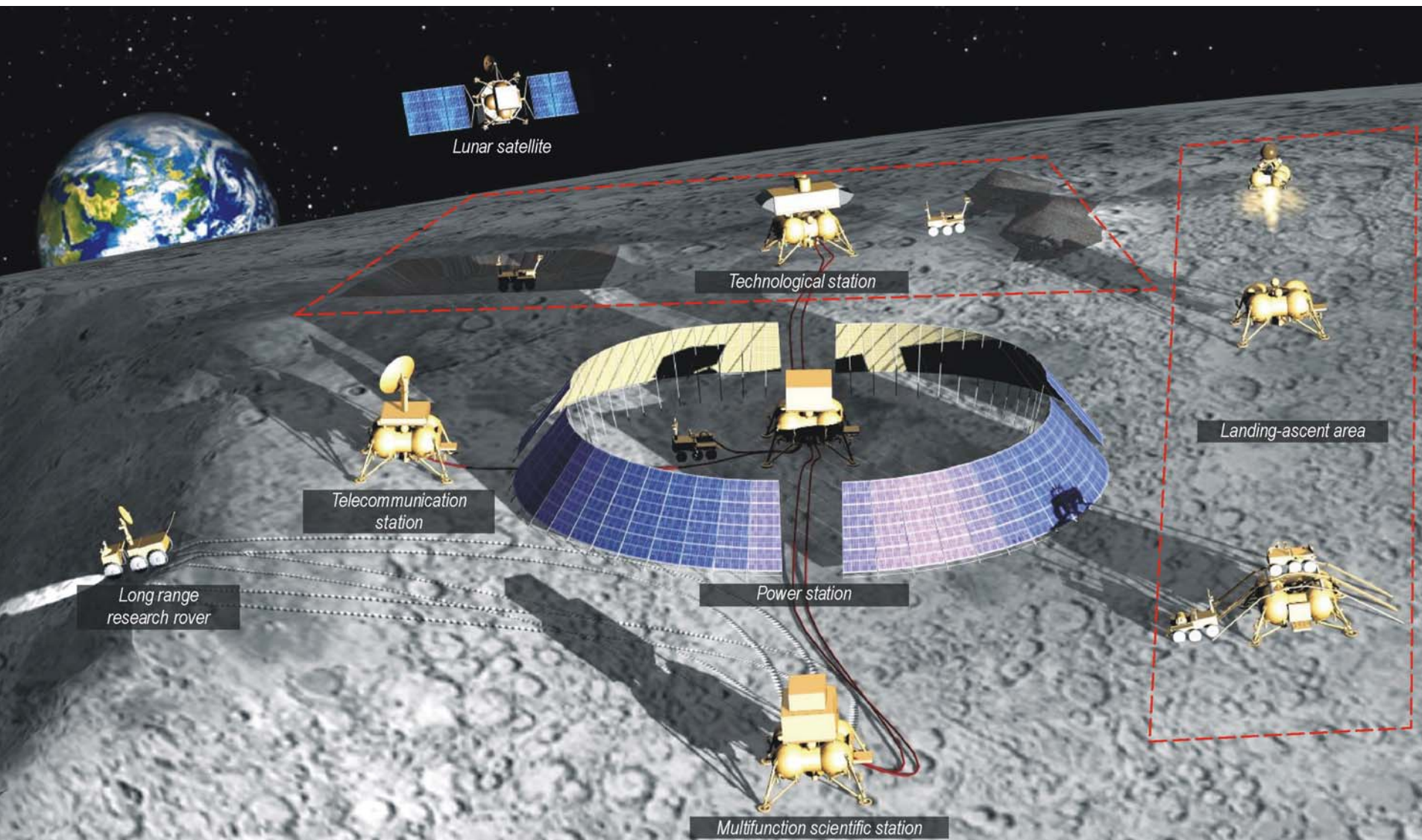




PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNAR POLYGON” PROJECT (Lunar robotic proving ground)



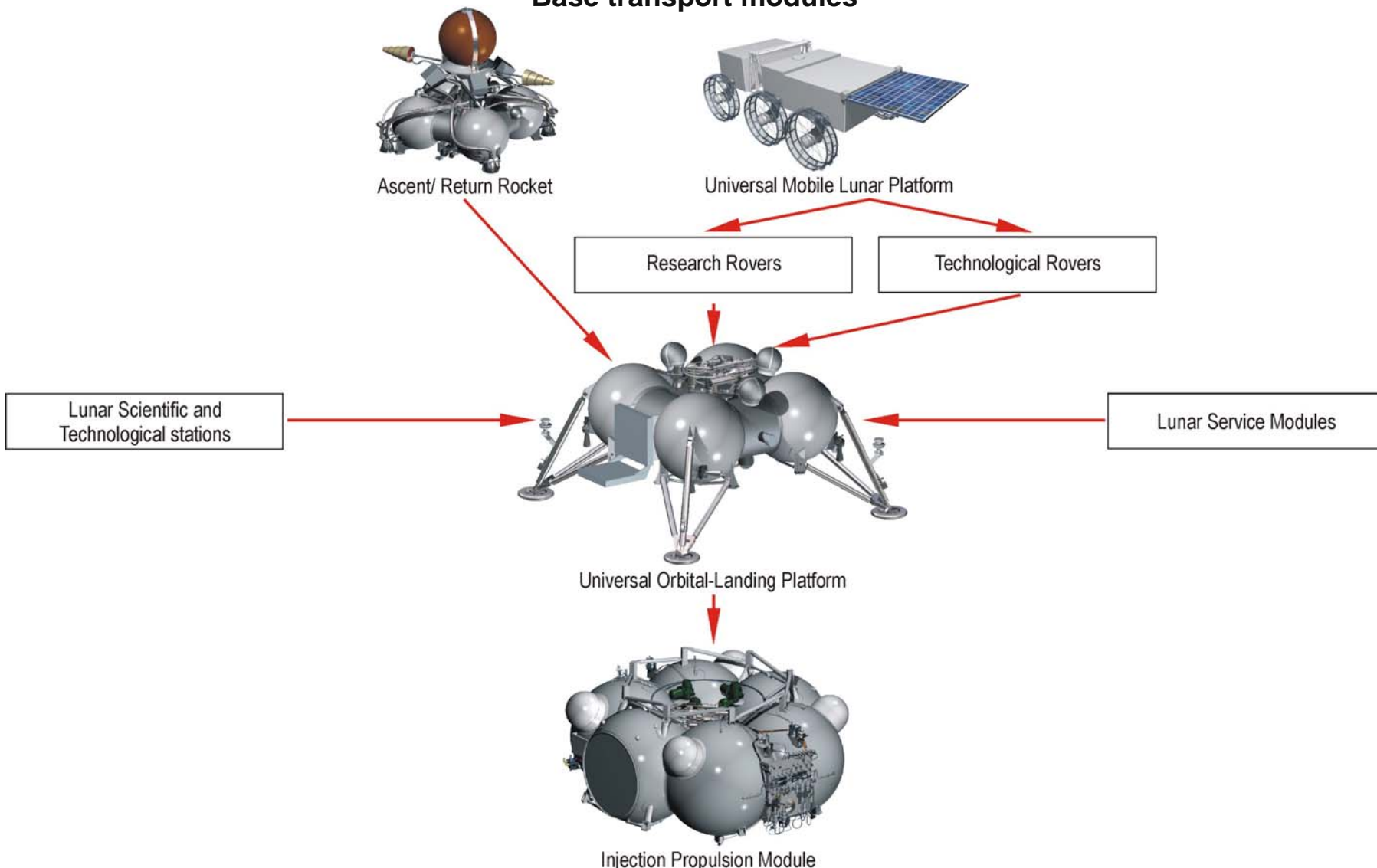


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNAR POLYGON” PROJECT (Lunar robotic proving ground)

Base transport modules



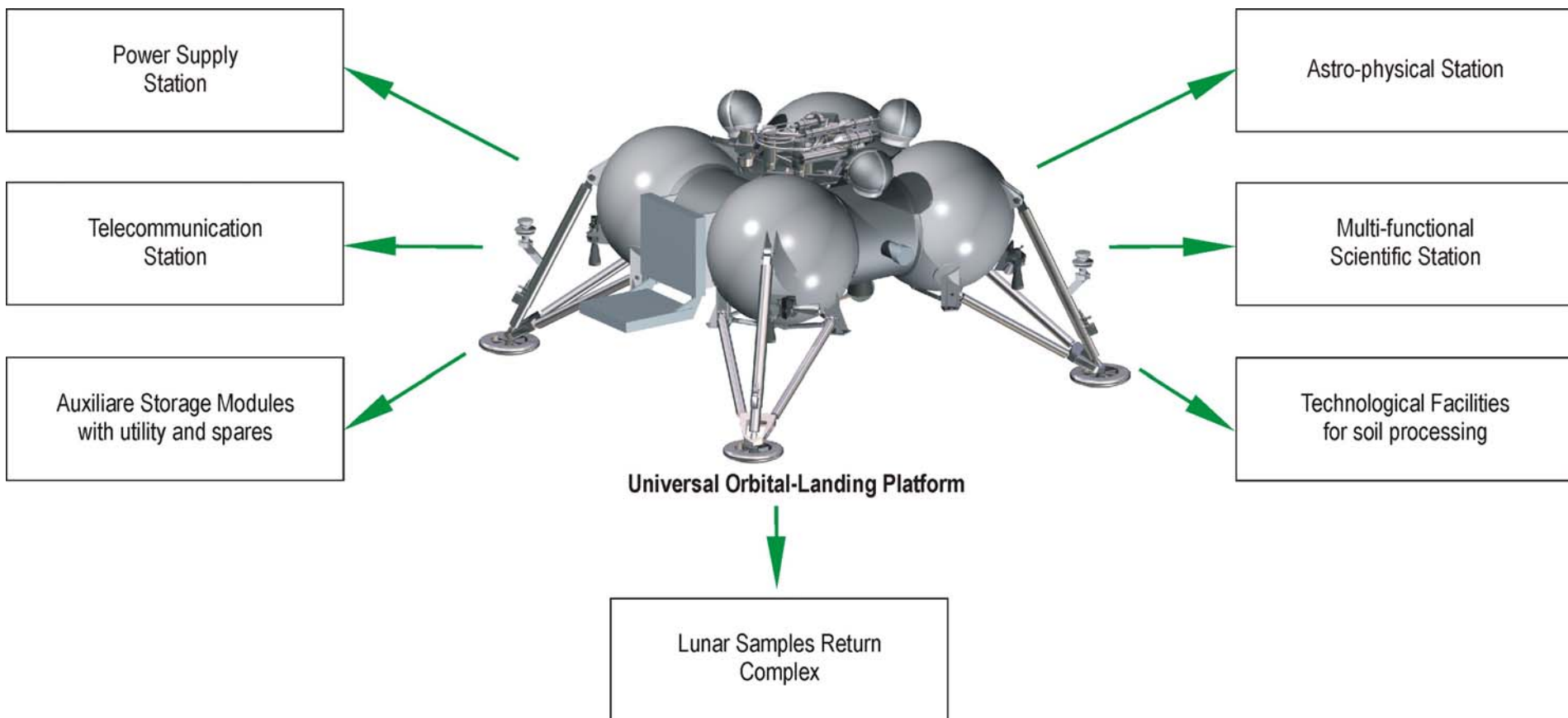


PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNAR POLYGON” PROJECT (Lunar robotic proving ground)

Stationary modules





PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES



“LUNAR POLYGON” PROJECT (Lunar robotic proving ground)

Mobile modules

