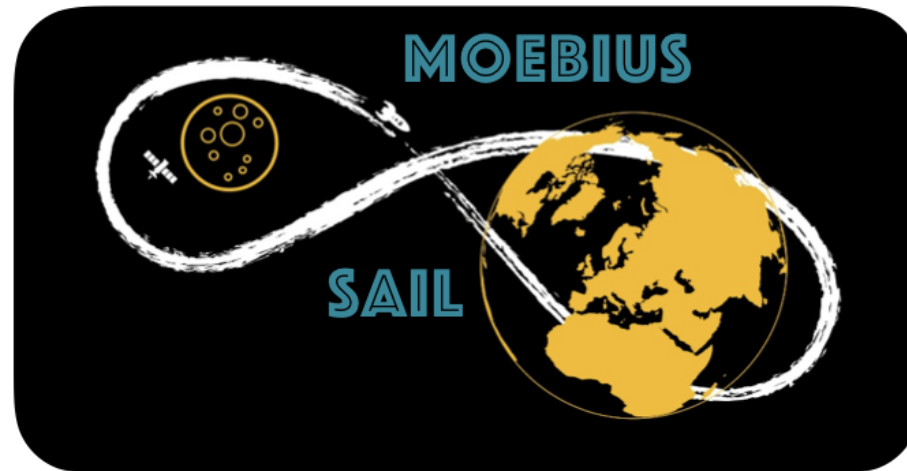


Moebius Sail

We deliver in space

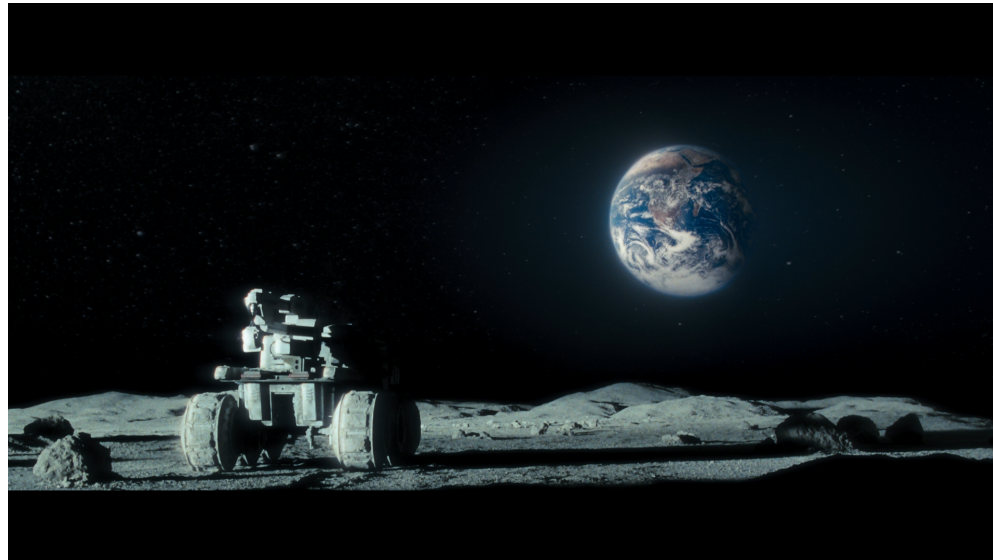


NASA International Space Apps Challenge

I3P - Torino, 2019-10-20

The concept

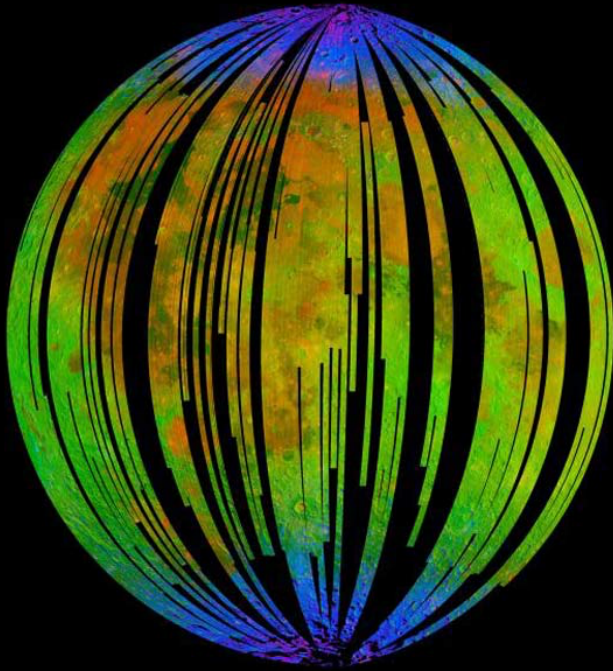
- Why? (Rare Earth Elements are scarce on the earth and therefore very expensive)
- What? Source Rare Earth Elements on the moon and carry to earth
- How?



The proposal

- Lunar Hub
- Spacecraft on a free reentry orbit
- Atmospheric reentry pod

Rare Earth Elements



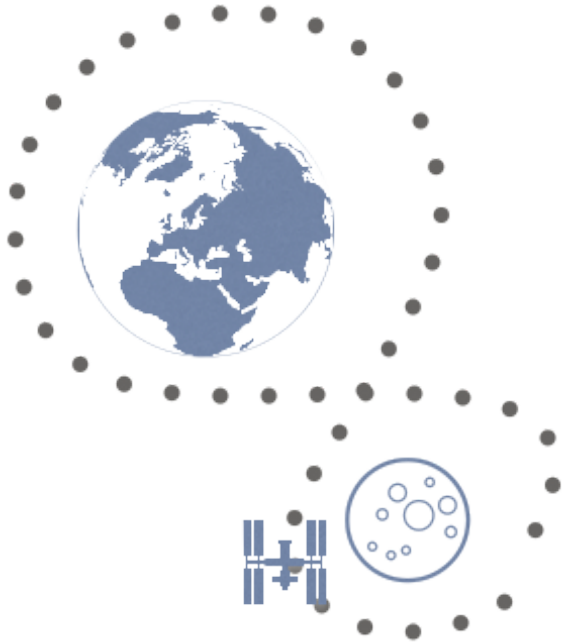
It is a three-color composite of reflected near-infrared radiation from the sun, and illustrates the extent to which different materials are mapped across the side of the moon that faces Earth.

Red shows an iron-bearing mineral called pyroxene, detected by absorption of 2.0-micrometer infrared light, **REE**.

This image of the moon is from NASA's Moon Mineralogy Mapper on the Indian Space Research Organization's Chandrayaan-1 mission.

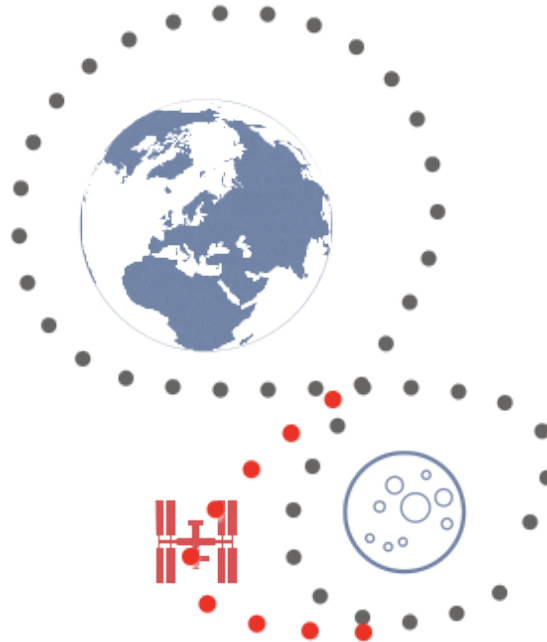
MISSION

- Lunar free return trajectory



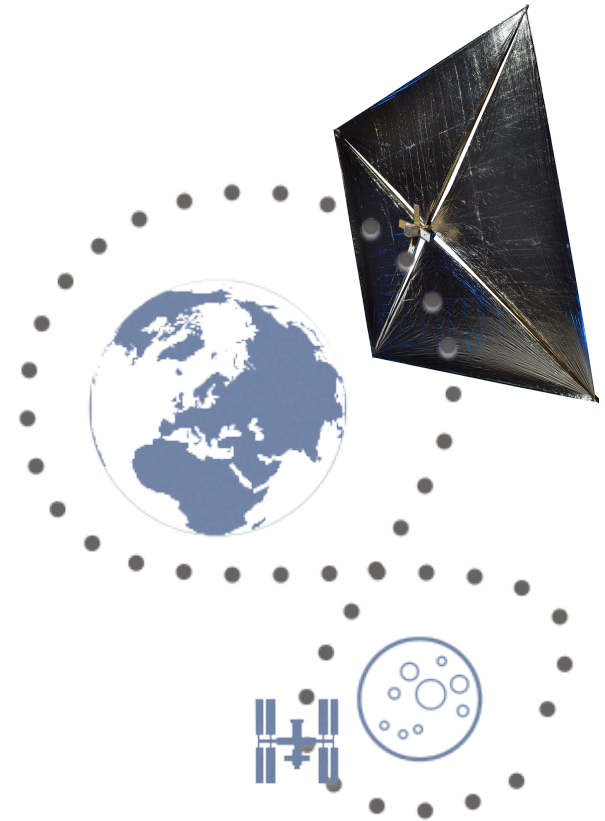
PROBLEMS

- Effects of solar radiation
- Jupiter influence



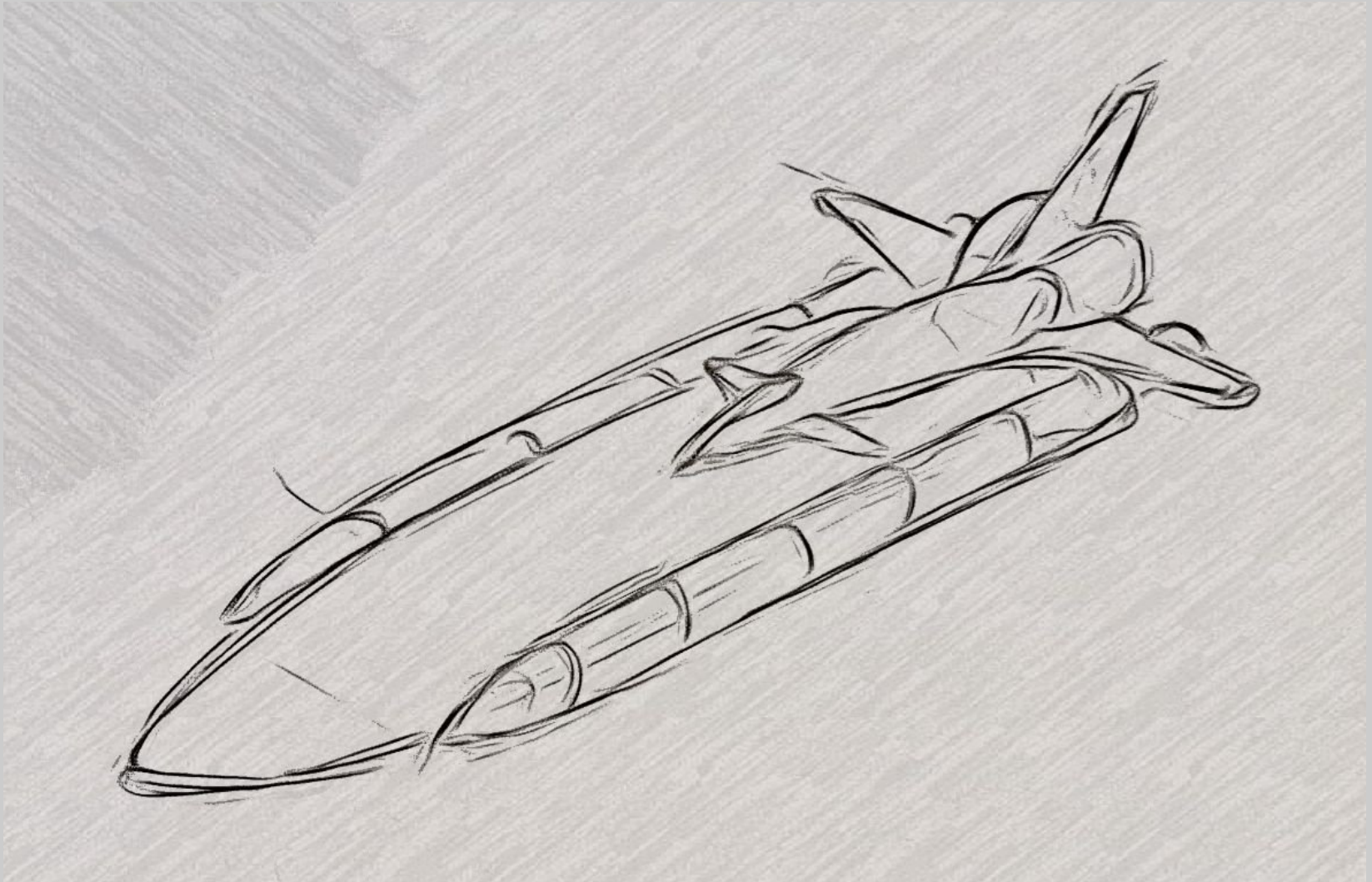
SOLUTION

- Solar sails



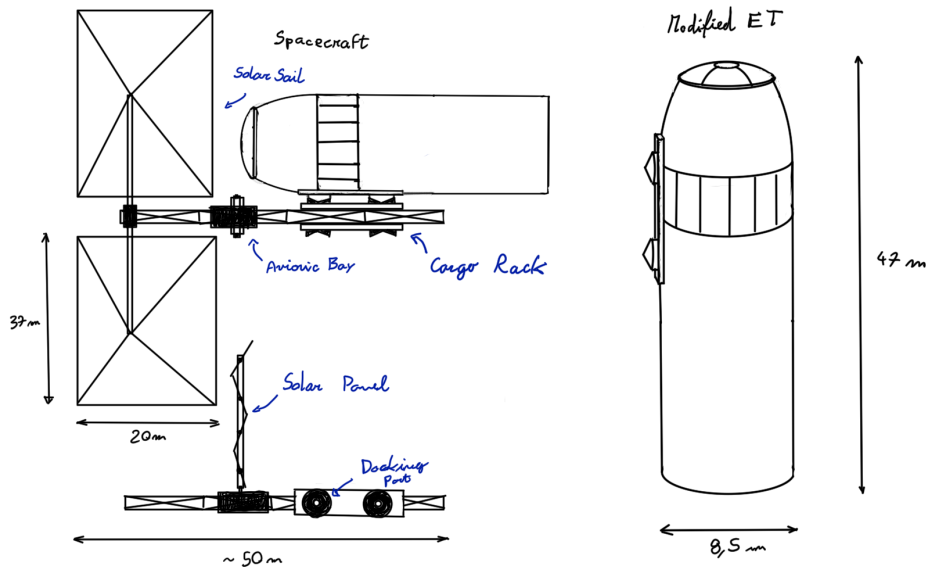


The spacecraft



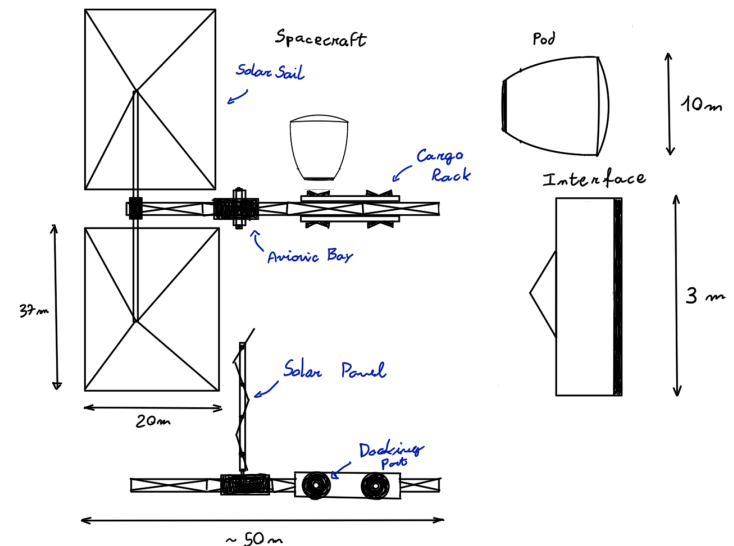
Initial phase

1. On orbit assembly of the spacecraft;
2. Free reentry orbit insertion;
3. Freight of the resource to the moon;
4. Building of the facility on the moon.



Main phase

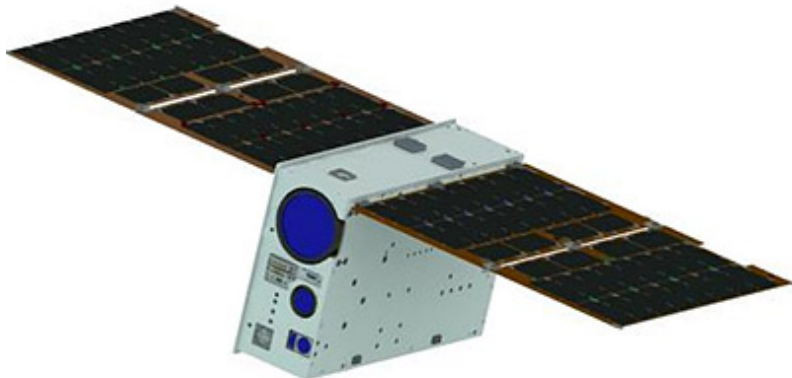
- Extraction and in situ resource preprocessing;
- Pods printing with regolith used for protect the ore during Earth reentry;



Future Proposals

- Near Earth Object survey

NEO survey equipment integrate in the avionic bay of the spacecraft or some cubesat 6U equipped with Ion EP or FEEP for orbit maintenance.



- LEO stockpile

Unvaluable ore, like Aluminium, Iron and Titanium can be harvested from the Moon surface and stockpiled in LEO for future orbital activities.



The Moebius-Sail team

- Riccardo Salgarella
- Gianpaolo Macario
- Gianfranco Poncini
- Carlo Di Costanza
- Demetrio Scuncia
- Nicolo' Lombardo

