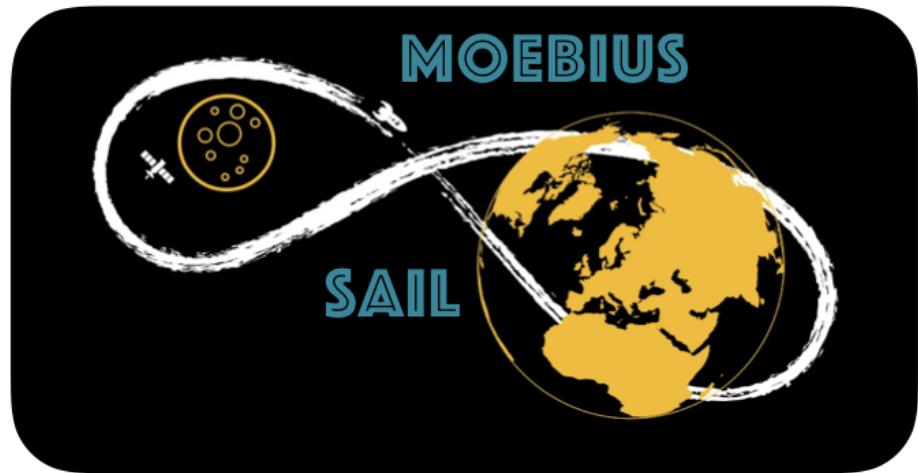


# Moebius Sail

We deliver in space



NASA International Space Apps Challenge  
I3P - Torino, 2019-10-20

# The concept

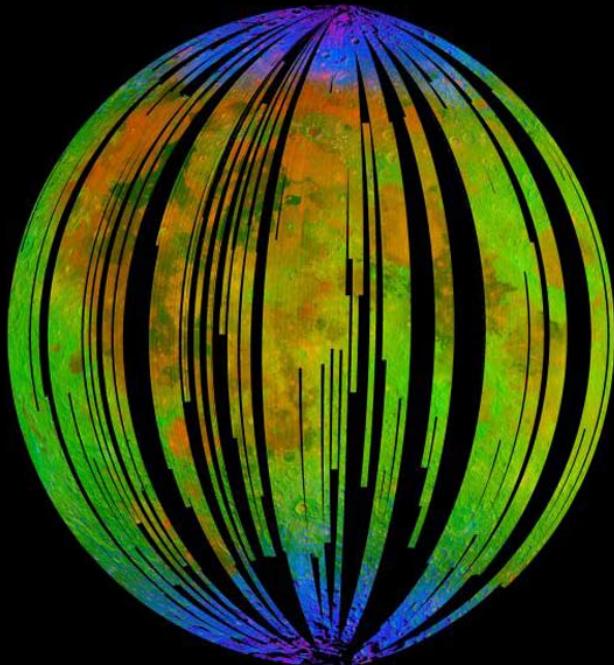
- Why? (Rare Earth Elements are scarce on the earth and therefore very expensive)
- What? Source Rare Earth Elements on the moon and carry to earth
- How?

# The proposal

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



# Rare Earth Elements



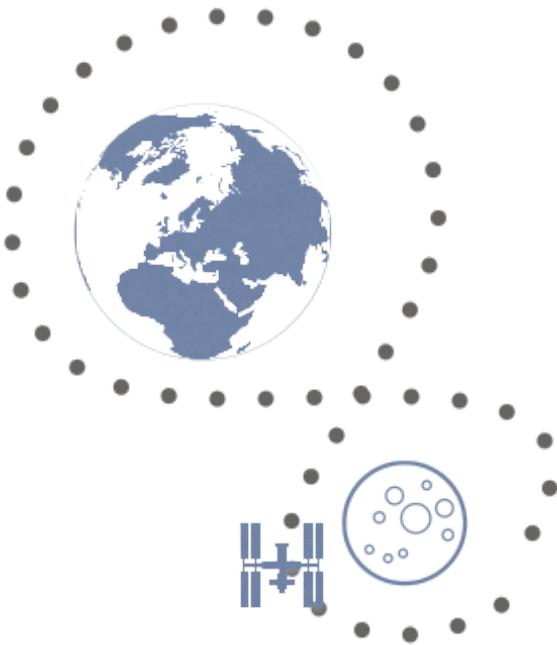
It is a three-color composite of reflected near-infrared radiation from the sun, and illustrates the extent to which different materials are mapped across the side of the moon that faces Earth.

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.

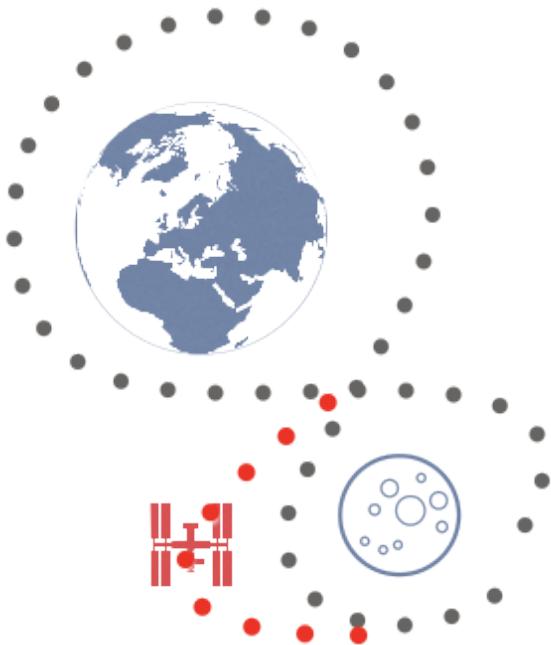
# MISSION

- Lunar free return trajectory



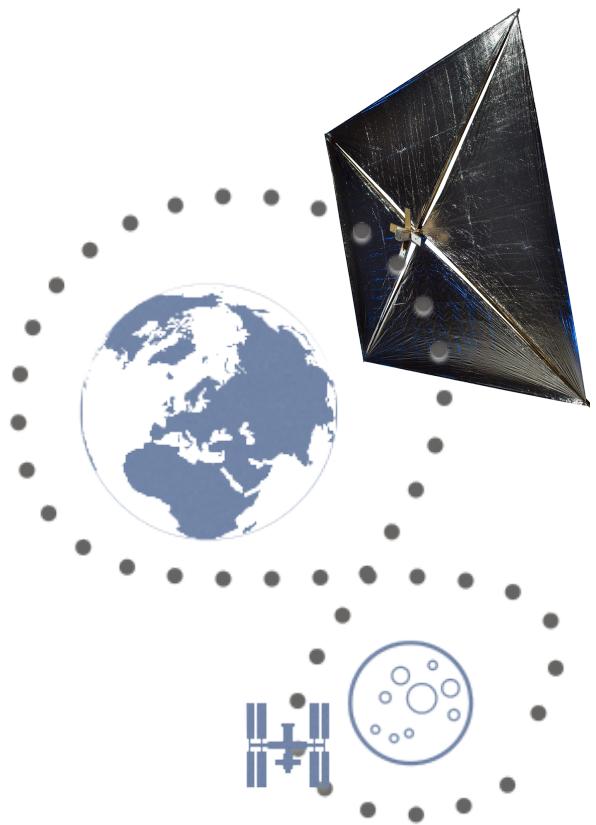
# PROBLEMS

- Effects of solar radiation
- Jupiter influence



# SOLUTION

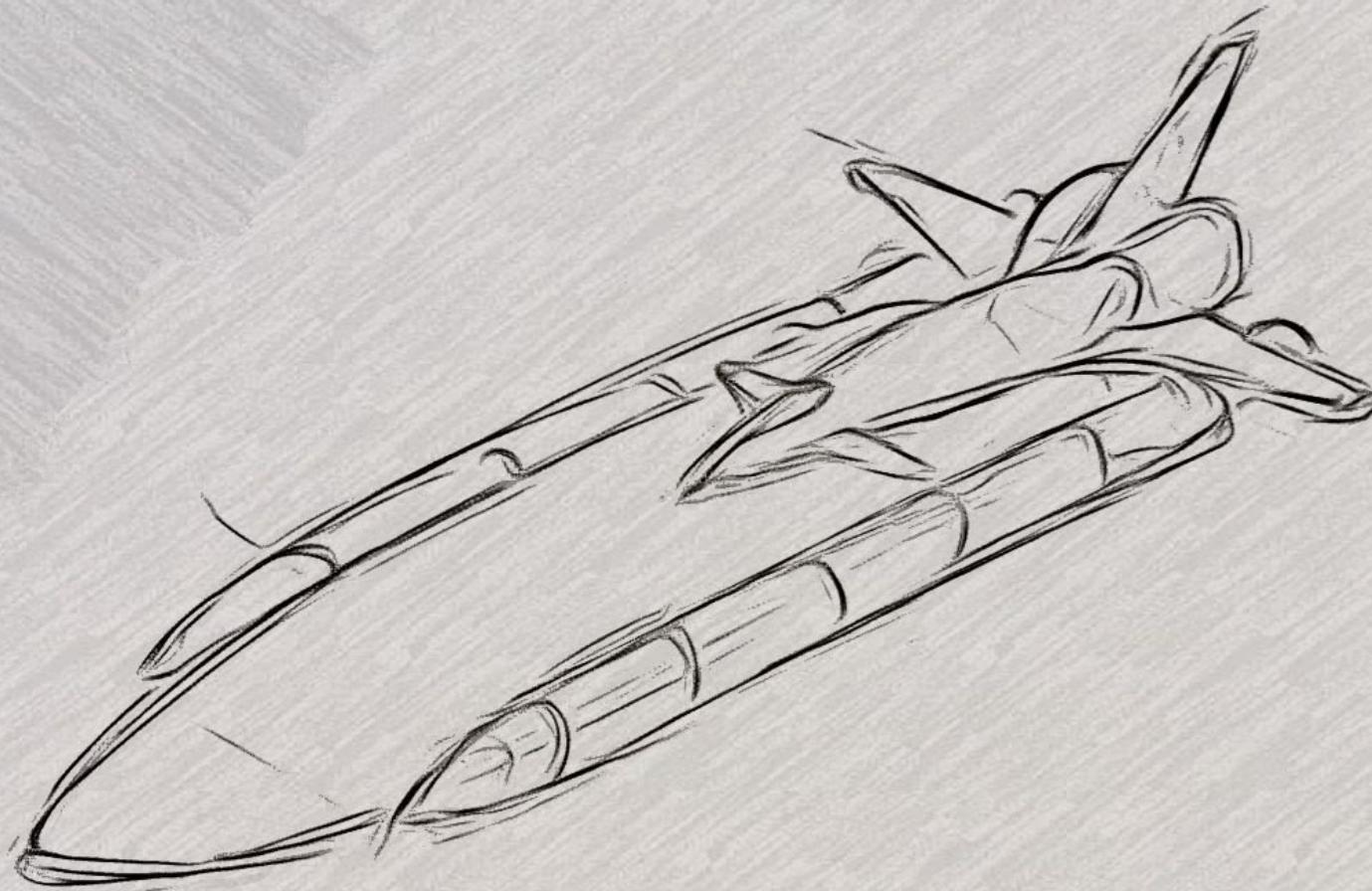
- Solar sails



# How?

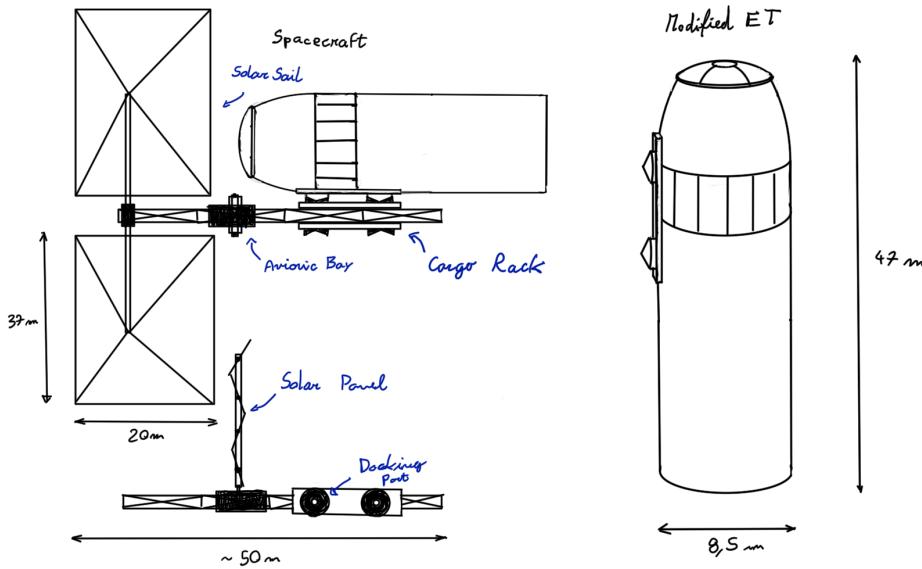


# The spacecraft



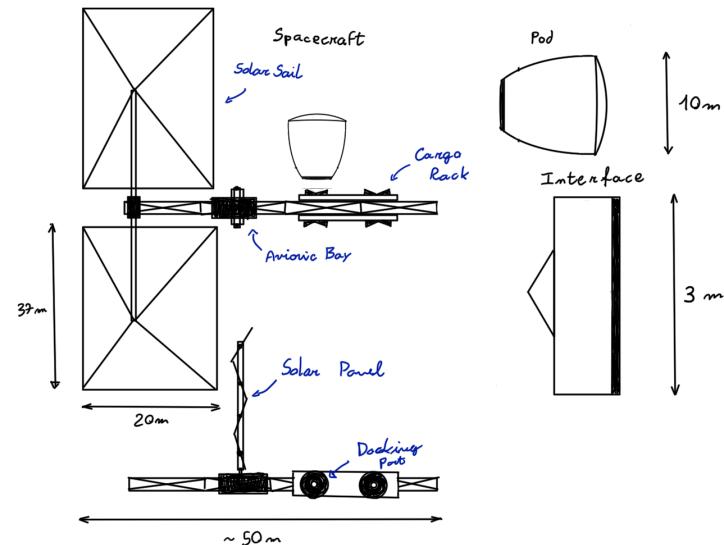
# Initial phase

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

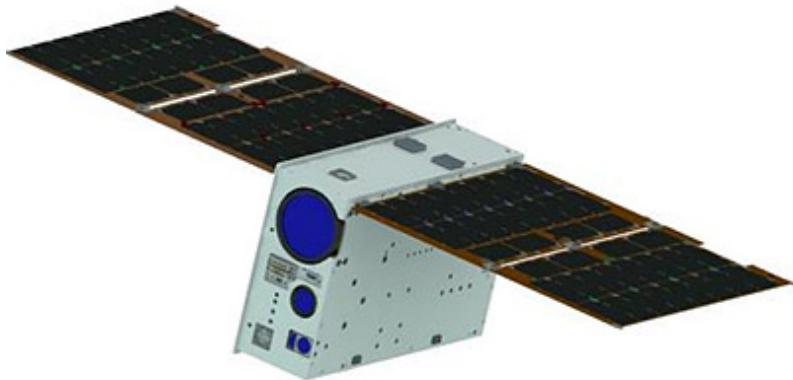
- Extraction and in situ resource preprocessing;
- Pods printing with regolith used for protect the ore during Earth reentry;



# Future Proposals

- Near Earth Object survey
- LEO stockpile

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



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

