

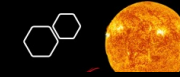
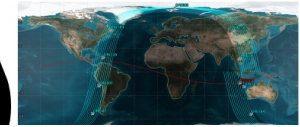
ORiS

Orbital Recharge in Space

Introduction – where we left off

- We decided to concentrate on an application for bringing energy to the Lunar surface
- Same technology
- Same concept of orbital placement
- Different application, different market
- Different Value Proposition

Space-to-space case study

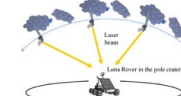


Space-to-space case study



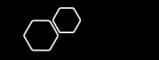
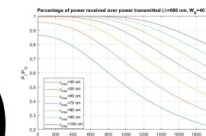
Cislunar space & beyond case study

- Concept:
- Constellation of ORIS satellites in lunar orbit / L1,L2 points
 - Laser transmission of energy



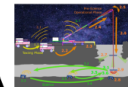
Space-to-space case study

Step 1: Analyze the Gaussian beam model to size the transmitting laser and the receiver device



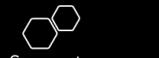
Lunar/martian exploration case study

- Lower mass and volume of rovers relative to long-life batteries
- Removal of cables, increasing reliability and improved system safety



Very complex system, could be improved and made more reliable without moving parts and cables running along the whole system to transport electrical energy.

Vertical solar panel developed to provide



Space to ground applications

- ORIS sees the potential, with its infrastructure, in supporting the energy demand of countries during the transition process towards green energy
- How? By sending clean energy in places on earth where it would be too costly or complicated with traditional infrastructures and exploit regions with made-ready infrastructures to convert energy supply into clean energy

SAVE THE PLANET



Why the moon?

- In the next few years, cislunar space will become more crowded
- Future plans to build a lunar habitat: 5 kW of estimated nighttime energy demand
- Shackleton Crater – future moon landing site, is at the lunar south pole



HUMANITY'S RETURN
TO THE MOON

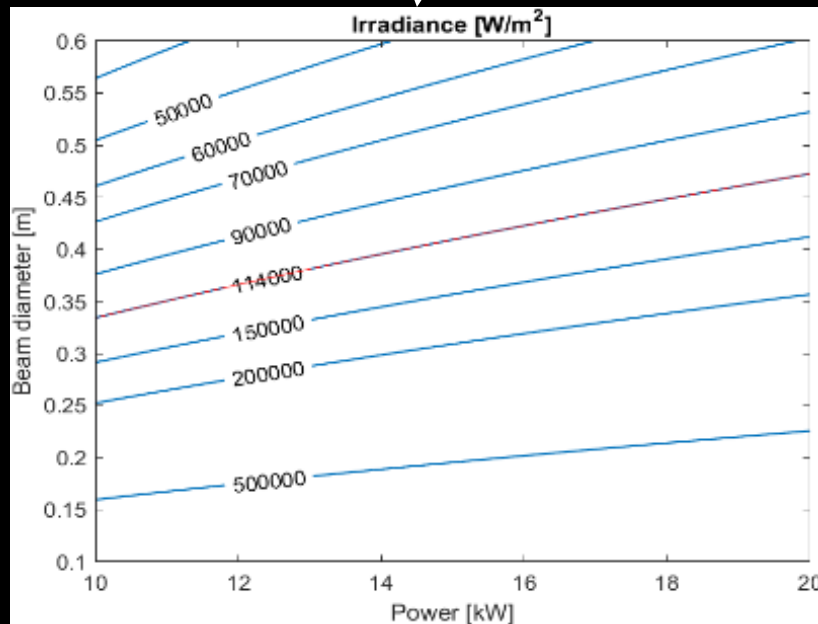


ORiS's solution

- Frozen orbits: candidate orbits and choice of the optimal configuration
- The objective of this presentation
 - System's main features
 - Receiver analysis
 - Laser features such as power output, collimation, irradiance
 - System feasibility, trade-off study

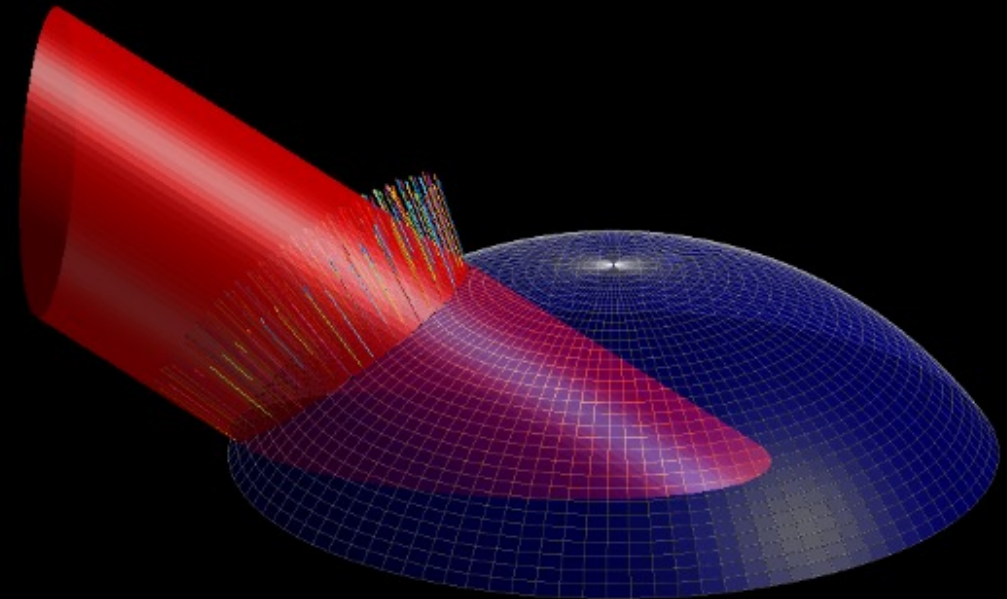
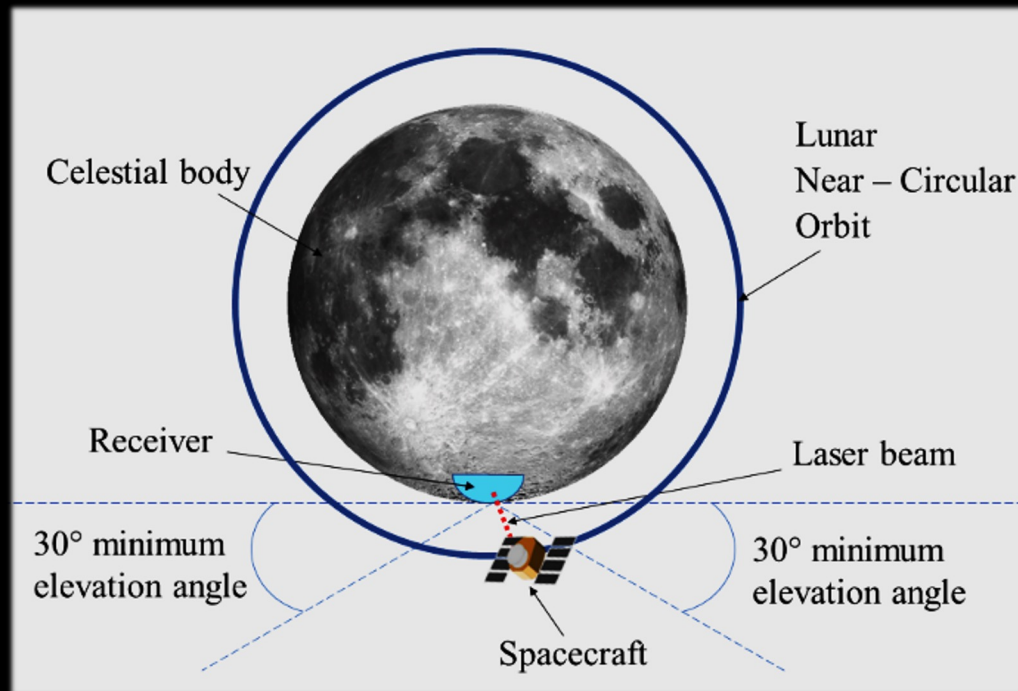
Technology

- Design process:
 - laser energy output: higher than for space-to-space applications
 - receiving technology: Photonic Power Converters & monochromatic photovoltaic cells
 - Pointing accuracy
 - EPS system sizing



Calculations

- Receivers on the lunar surface → maximum size estimation
- Receiver shape optimization to minimize loss



Conclusions

- Figures of merit
- Trade off analysis

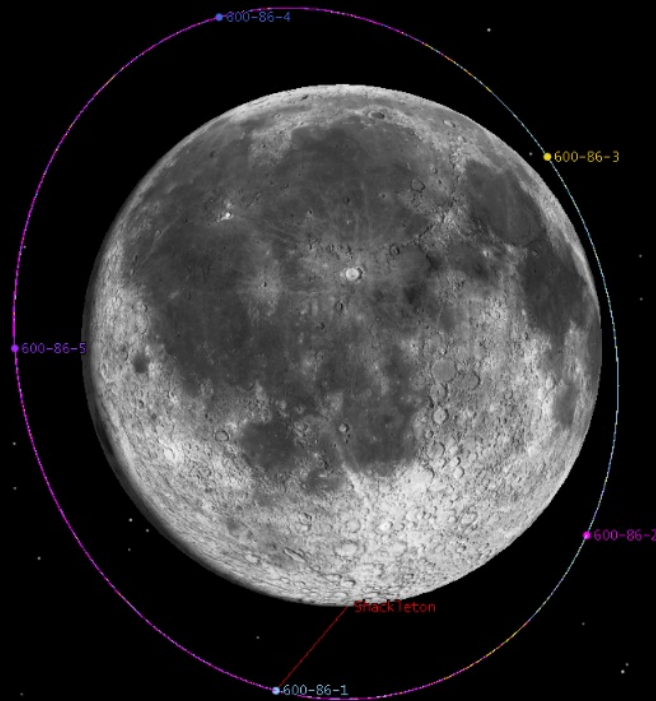


Table 5. Altitude trade-off study

Altitude	Energy in one year	Receiver dimensions	Pointing accuracy	EPS weight	Score
300	3	9	9	9	105
400	6	8	8	7	107
500	5	8	7	6	95
600	9	7	6	6	108
700	8	7	5	5	96

Thank you!