# Regolith harvesting on Moon surface: Excavation and beneficiation in low gravity environments

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Space exploration is a global endeavour with many technical challenges to be taken. Its main objective is to extend our civilization to other bodies of the Solar System, starting with the neighbouring ones, by sending robotic as well as human missions. Preparation for the space bodies exploration requires systematic scientific investigations that enlarge our knowledge about target bodies and in consequence allows to exploit its results for the benefit of future exploration programs, but it also requires development of available technologies

In-Situ Resource Utilisation (ISRU) is the collection, processing, storing and use of indigenous materials from space for use in space . Compared to the current approach of transporting material and equipment from Earth, ISRU reduces overall mission cost and risk. In particular ISRU would reduce the reliance of transporting material from Earth; allowing the in-situ refuelling, maintenance and repair of satellites; the establishment of a space economy; and human exploration of the solar system. The potential benefits of resources in space are in three areas:

- Asteroids with carbon, water and metal resources (bulk carbonaceous chondrites would be economically viable ore for platinum group metals). Asteroids have the additional advantage of a negligible gravity well and low $\Delta v$ requirement to travel elsewhere in the solar system.
- The Moon with oxygen and lunar regolith resources. It has a low gravity well and is relatively close to Earth.
- Mars with carbon dioxide, probably subsurface water and Martian soil as resources. A key scientific quest for Mars is the search for extra-terrestrial life.

The topic of the proposal is focused on excavation and beneficiation step in mining oxygen from lunar regolith on equatorial region of the Moon. The main scientific goals are focused on analysis of reduced gravity impact on excavators efficiency, analysis of the interaction between regolith particles during excavation, optimization of regolit beneficiation process constrained by space environment and analysis of the vacuum impact on excavator efficiency and reliability.