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LUNAR MINING

Abstract

The Moon is the closest mineral rich destination beyond Earth's orbit. Adapting terrestrial mining exploration operations to accommodate prototype lunar mining objectives could achieve successful methodologies for broader deep space, asteroid and planetary exploration. A 'Quick Cores(QC)' mission concept could insert an automated drilling platform, extract core samples to varied depths then extract samples for return to Low Earth Orbit(LEO). A complement of mobile robots, including specialized equipment in a support capacity, could facilitate a perpetuating lunar mining operation. A micosat scale orbiter can direct basic flight 'touch-n-go' operations, with insertions and extractions by lunar landings. A stepwise approach could expand lunar assets as needed.

Ideally, a mature 'QC' mission could insert a fully automated drilling platform, extract core samples and return them to LEO. An initial prototype design concept could be adapted for a terrestrial 'live' test case. For a given remote GPS location, un-navigable or inaccessible by economical means, a fully automated drilling platform can be inserted, core samples extracted and returned to low/high altitude for recovery. The Moon can provide an un-navigable and inaccessible environment for a test suite of insertion, drilling extraction and sample return opportunities. The QC automated drilling platform would include everything necessary to drill beyond current ground proofing:

- Portable drills (back pack drills) have been used for prospecting for quit awhile. They can usually only drill a few feet into rock but that is often good enough. The core is about 1/2 inch in diameter.

- For soil sampling often hand augers are used, again by someone on the ground. They can only go several feet or until they hit a boulder.

- A device that could drill 100 feet would be very impressive. Yet experts in field geology believe there could be a challenge with the QC's 1/2 inch diameter drill. It likely could only reach that depth in soils and clays with no pebbles or stones.

- Certainly the diameter of the QC's core should be adequate for any chemical or mineralogical testing. But as the core diameter decreases so does core recovery.

- Geophysical properties of rocks are best identified by an actual sample. Even something that could grab a 3 foot soil sample could possibly come in very handy.

A 'QC' mission concept stands to gain over the next decade for objectives near and far, as economic practicalities accelerate a need for fully automated, independent mining capabilities.