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9th SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES, CONCEPTS AND TECHNOLOGIES (D3)
Strategies and Architectures to Establish a "Stepping Stone" Approach to our Future in Space (1)

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EXPLORATION COLONIZATION RESOURCE EXTRACTION AND UTILIZATION OF MOON AND MARS (ECROMM)

Abstract

This paper proposes a concept of exploration, colonization, resource extraction & utilization of the moon and mars that may be feasible in near time with current technologies, has scope for international collaboration and would acquire self-sufficiency, require minimum supplies from Earth itself and would be able to recover the cost of the programme as well as supply precious mineral and other by-products back to Earth as a substantive economic returns of implementing the programme.

Moon and mars holds the answer to mankind's future in space. ECROMM is long term concept developed for future exploration, colonization, resource extraction & utilization of moon and mars. The following five mission phases are envisaged within this concept.

Phase 1: To moon and mars.

Phase 2: Colonization in moon.

Phase 3: Mars human space exploration.

Phase 4: Mars colonization.

Phase 5: Future expansions and journey beyond mars.

All the phases involve robotic and human mission, except phase 1 which involves only robotic mission. Phase 2 and phase 3 are designed take place simultaneously so that overall mission time can be reduced. Moon and mars has resources like hydrogen, water, carbon dioxide, methane in their regolith and atmosphere. The concept involves extraction of resources like helium 3 & water from moon and utilizing such resource for crew support and propulsion system. Mars has methane (10.5 p.p.b.)and carbon dioxide (95.32 %) in its atmosphere which can be converted to water and fuel by simple chemical process .By phase 5 the colonies in moon and mars will be self-supporting and would require very less support from earth.

ECROMM has scope of international collaboration of government and private space agency for developing different systems / components for the total mission. Participation of multiple countries will significantly reduce the cost, risk, and construction time of the system as observed in the construction of "International space station (ISS)"

ECROMM concept utilizes current technology. There is scope of integration of future technology that has not been tested i.e. nuclear fusion engines. Mining technology is the crucial part of this concept. Development of advanced mining system for moon and mars will reduce the cost of the mission as the resources on moon and mars will be utilized for propulsion system and crew support and supply precious minerals and by-products back to earth.