15th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)
Space Mineral Resources, Asteroid Mining and Lunar/Mars insitu (5)

Author: Ms. Sophia Casanova
University of New South Wales, Australia, s.casanova@student.unsw.edu.au

MINING FOR WATER ON MARS – A GIS APPROACH TO CONDUCTING PRE-SITE SELECTION FEASIBILITY STUDIES

Abstract

In recent years a more concerted effort is being applied to identifying potential water resources on Mars to be utilised for future human missions and developing the technologies to mine and extract them. Involved in this effort is a need to adequately assess the feasibility of carrying out the planned mining operations. Such evaluations need to form part of the site selection process to assess the feasibility of developing a specific deposit.

This study forms part of broader analysis on conducting mineral prospectivity mapping and analysis for water resources on Mars using currently available Mars orbital data sets in conjunction with Geographic Information System (GIS) software. GIS and multi-criteria decision making techniques have been used for many years to support resource exploration and mining operations on Earth. This paper discusses the most recent developments in this field with a particular focus on mineral prospectivity mapping as well as logistics operations planning and optimisation using geospatial tools. Using case studies from proposed Mars human exploration zones this paper investigates the potential adaptation of these techniques for pre-site selection feasibility analysis on Mars from a mining operations standpoint.

This study presents a broad overview of the complexities of these modelling and mapping techniques when applied to Mars mining operations and provides a modelling framework for site screening and site evaluation techniques using GIS and Mars orbital data. Future studies could look towards incorporating a more rigorous risk and uncertainty analysis into the model.