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Contribution of Moon Village to Solving Global Societal Issues (2)

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LARGE-SCALE THERMAL MINING OF LUNAR ICES: MITIGATION OF PRODUCTION DECLINE

Abstract

Extraction of ice in Permanently Shadowed Regions of the Moon using the thermal mining method may follow distinct production phases closely related to the build-up of a sublimation lag and loss of bulk thermal conductivity. Negative feedbacks in lunar water production, capture and processing need to be closely studied and mitigated using operational and technological methods. Two novel production methods are especially promising: (1) continuous thermal mining, utilising fast removal of the sublimation lag, and (2) fracking thermal mining, utilising injection of a high thermal conductivity material into icy regolith porous space and fractures. These two methods are studied in homogeneous and heterogeneous icy deposit conditions using combined heat and mass transfer model, and are compared with the baseline thermal mining method yields. Technical feasibility of those methods is also discussed. Production improvements higher than 100