Modeling of solar irradiance for lunar base locations

Abstract

An incident radiation is an essential factor for a discovery of a place suitable for building a lunar base. This thesis presents a new approach for modeling of solar irradiance in an arbitrary lunar location at selected time. Shadowing by surrounding terrain is calculated by spatial intersection between lines of illumination and digital terrain model. Model also takes variable distance between Moon and Sun and areal representation of the Sun into account. In this thesis a new geometrical procedure for calculation of reflected irradiance is designed. The resulting model is implemented within ArcGIS software as an executable script, which utilizes the freely available data from Lunar Reconnaissance Orbiter as an input.

Key words: Moon, solar irradiance, geoinformatic modelling, scripting