

SPACE POWER SYMPOSIUM (C3)
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DISCORD BETWEEN GAIA AND SELENE: WHY SELENOTHERMAL ENERGY IS INSUFFICIENT
FOR ELECTRICAL POWER GENERATION

Abstract

During the year 2012, the German Aerospace Center (DLR) has, in the framework of the internal Competition of Visions, investigated the possibility of using residual lunar heat, dubbed selenothermal energy, for electrical power generation by application of e.g. Rankine or Stirling processes. The initial idea was mainly based on the fact that the lunar subsurface region has an increased temperature (250 K) in comparison to the surface (ca. 120 K during lunar night) and therefore a heat reservoir that could potentially be used for energy production during the lunar night, where lack of solar illumination prevents usage of solar cells. Preliminary results have been previously published on the 63rd IAC in Naples. More review, calculation and testing has however shown that the heat flow within the lunar soil cannot support power generation in a way or amount meaningful for a lunar infrastructure or mission. Initial calculations estimated the available heat flow to about 4 W/m, which has to be corrected downwards by a factor of 100 following the more detailed research. In this paper the details of this research will be elaborated, explaining new calculations and the reasons for the divergence of the initial calculations and the more recent ones. It will be shown how the data review led to the conclusion that selenothermal energy cannot be used in the desired way analogously to geothermal energy.