

NASA Advisory Council Subcommittee Recommendation

Subcommittee Name: Planetary Science

Chair: Sean Solomon

Date of Public Deliberation: 3-4 March 2008

Date of Transmission to Science Committee: 28 March 2008

Short title of the proposed Recommendation:

Power sources for long-lived geophysical networks.

Short description of the proposed Recommendation

The PSS recommends that NASA take steps to develop long-lived power supplies for use in landed networks.

Major reasons for proposing the Recommendation

Current plans for the International Lunar Network, which call for solar and battery power, may not permit nighttime operation of the surface stations, and the overall longevity of the stations is uncertain. These plans are not well matched to the scientific objectives of a geophysical network, particularly one that is built up over a span of many years as NASA and international partners add stations as opportunity affords. Turning off stations at night would prevent a global network from ever achieving its full potential. The ability to locate seismic sources would be degraded from that possible with a fully operational network and would depend on time of day. Moreover, some of the most important seismic signals (e.g., deep moonquakes) are known to correlate in time with lunar tides, one of the dominant periods of which is diurnal, so turning half the network off at any given time would increase the chance of missing such correlations. Worse, information on the lunar core might be precluded, because it depends on the simultaneous operation of stations near or above a given seismic source (to provide an accurate source location) and stations antipodal to the first group (to record waves from that source that traverse the near-center of the Moon).

In the longer term, the lack of long-lived power supplies for lunar exploration will limit the longevity of any lunar outpost, particularly one not located in an area of nearly permanent sunlight.

Consequences of no action on the proposed Recommendation

In the absence of long-lived power supplies for lunar and Martian geophysical networks, the value of the recorded data sets could be substantially reduced and some important phenomena may not be captured.