

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

Author: Dr. Stephan Ulamec

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, stephan.ulamec@dlr.de

Dr. Jens Biele

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, jens.biele@dlr.de

Mr. Ed Trollope

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, ed.trollope@dlr.de

THERMAL CONCEPTS FOR SMALL SURFACE STATIONS, HOW TO SURVIVE THE LUNAR
NIGHT.

Abstract

In the frame of the recent worldwide activities of Lunar research, including various studies for surface stations, the aspect of longevity of such stations represents a particular technical challenge. The reason for this lies in the long (about 14 days) and cold Lunar night during which it is non-trivial to keep spacecraft systems alive and sensitive equipment within an acceptable temperature range.

Various concepts will be described, how to survive Lunar night, both with and without radioisotope heater (RHU) technology. RHUs normally imply the use of highly toxic material (typically plutonium), which is politically problematic and a driver for cost and safety procedures.

Concepts without RHUs, need to foresee special measures, like innovative methods for energy storage, extremely efficient thermal insulation or sub-surface positioning of all temperature sensitive components.

The paper emphasizes on the thermal design for small stations (including penetrators) being partly embedded in the Lunar regolith.