

Lunar Exploration Analysis Group

Report of Analysis Results of the Geology-Geophysics Specific Action Team (GEO-SAT)

Introduction

GEO-SAT represents an activity of phase 2 of the Themes, Objectives, and Time Phasing (TOP) Specific Action Team (SAT) that was requested by NASA ESMD and approved by the chair of the NASA Advisory Council. In addition, a formal request from the Chair of the SMD Planetary Sciences Subcommittee, Sean Solomon, asked the LEAG to rank the geology related objectives against the Science Theme as an input into the lunar science strategy activities that will take place in the big Jack meeting in February of 2007. The purpose of the GEO-SAT activity was to suggest relative rankings of the objectives related to lunar geoscience for lunar exploration within the core theme of science ("Pursue scientific activities to address fundamental questions about the solar system, the universe, and our place in them"). GEO-SAT made its rankings on the basis of scientific merit and made no assumptions about mission or architectural constraints. We did not identify specific activities or critical capabilities, but this is important to do in the future. We did, however, add comments for each objective addressing the question, "If there is only a single outpost site, to what extent will this objective be addressed?" (We assumed a rover range of 20 km in all directions from a base.)

Participants

GEO-SAT participants represented a range of lunar science specialties, but with each having a broad overview of lunar science.

Core Group (Telecon and synthesis of comments):

Jeff Taylor (University of Hawaii), Co-chair
Steve Mackwell (LPI), Co-chair
Clive Neal (University of Notre Dame)
Charles Shearer (University of New Mexico)
Brad Jolliff (Washington University in St. Louis)
Bruce Banerdt (JPL)
Ben Bussey (APL)
Sam Lawrence (University of Hawaii)
Lawrence Taylor (University of Tennessee)

Extended Group (invited to put comments on web site):

Roger Phillips (Washington University in St. Louis)
Paul Spudis (APL)
Ariel Anbar (Arizona State University)
Paul Warren (Paul Warren)
Jim Head (Brown University)
Paul Lucey (University of Hawaii)

Dave McKay (JSC)
Gordon McKay (JSC)
Gary Lofgren (JSC)
Mark Robinson (Arizona State University)
Randy Korotev (Washington University in St. Louis)
Jeff Gillis-Davis (University of Hawaii)
Lon Hood (University of Arizona)
Kevin Righter (JSC)
Mark Wieczorek (Inst. de Physique du Globe de Paris)
Tim Grove (MIT)
John Longhi (Lamont-Doherty Earth Observatory, Columbia University)
Lars Borg (Lawrence Livermore National Laboratory)
Mark Cintala (JSC)

Procedures

The product produced by GEO-SAT is a spreadsheet containing the list of objectives and their descriptions, summaries, and value, along with our ranking and two comment columns. The comments in the first of the comment columns give an overview of what it will take to address the objective. The second comment column explains the extent to which the objective can be addressed from a single, permanently-occupied outpost.

GEO-SAT considered objectives in three categories only: geology, environmental characterization, and ISRU. The first is clearly focused on science, but some objectives in the other two categories also contribute to major science questions.

GEO-SAT used a numerical ranking that used the entire scale between 1 and 10. We first ranked each objective into broad categories of high, medium, and low priority (*for the Science theme*), as follows:

High (8–10): first-order science problem

Medium (4–7): Useful for addressing scientific problems

Low (1–3): Not useful or only marginally useful to addressing scientific problems

The group then ranked each objective numerically by voting on the most appropriate score for each objective. This produced a reasonable consensus on the value of each objective.