

Recommendation on Heliophysics Science Associated with Lunar Exploration

Issue: The Agency's Vision for Exploration (VSE) calls for the return to the moon with robotic and manned missions. There is a need to articulate the Heliophysics related science required for and made possible by the planned the NASA lunar exploration activities.

Background: The lunar plasma and radiation environment and those phenomena that drive and control it both within and outside the Earth's magnetosphere, are intrinsically part of the science domain of the Heliophysics (HP) Division. The productivity of robotic and manned missions is directly dependent on the ability to operate safely in the lunar environment. Since the inception of the space program with Explorer 1 in 1958 and continuing to the present, scientists in the Heliophysics community have characterized and developed an understanding of the connected Sun-Earth system. The Heliospheric science community is uniquely qualified to address the compelling science problems that are required for VSE. It can provide critical measurements, models, and understanding to inform engineering decisions and architectures that are required by the agency to achieve the VSE goal of return to the moon. A vigorous program must start now and it has with the current and near term set of Heliophysics missions. Further critical measurements, ready for implementation are detailed in the current HP roadmap.

Once we have achieved a presence on the moon there are new classes of experiments that will provide data to improve our understanding of the requirements for a safe program of lunar activities. The nearer term robotic and later manned missions will likely have different capabilities for the measurements and investigations. For each of these types of missions there is the need to articulate credible and useful measurements and investigations. Consequently the role of the Heliophysics Division, and by extension the associated science community, is different than that of the other divisions in SMD. It not only can take advantage of the VSE lunar infrastructure and architecture to pursue scientific endeavors that are compelling on their own right, but it can also provide critical input to the ESMD programs and projects that enable efficient, safe, and scientifically productive return to the moon.

Recommendation: The Heliospheric Science Subcommittee recommends that measurements and investigations that are enabled by and that enable the return to the moon for both the robotic and manned missions be articulated in a report. The report would be adjusted once the schedule and specific lunar architecture and infrastructure are defined. The report will be developed by a sub-panel under the direction of the Heliophysics Science

Subcommittee and appointed by the Director of the NASA Heliophysics Division. The report will include broad input from the science and engineering community at large. It will articulate the support of the Heliophysics discipline for the robotic and manned missions and the science investigations that are enabled by the VSE. It will not recommend strategic direction for the discipline. The content of the report may be used as it is deemed appropriate in future strategic roadmap activities.