

Plenary II: Science Missions Enabled by Nuclear Power and Propulsion

Session Chair: S. Howe, Center for Space Nuclear Research

The second plenary session of the NETS 2011 conference provided insights into applications of nuclear technologies to potential science missions. The session was chaired by Dr. Steven D. Howe of the Center for Space Nuclear Research. The invited speakers, their affiliations, and their presentations included:

Space Nuclear Power and Propulsion: The Good, the Bad and the Ugly
Dr. Ralph McNutt, Applied Physics Laboratory / Johns Hopkins University

Expanding Science Knowledge: Enabled by Nuclear Power
Karla B. Clark, Jet Propulsion Laboratory / California Institute of Technology

Increased Science Return and Space Nuclear Power
Dr. Richard Ambrosi, University of Leicester / UK

Dr. Howe opened with a brief statement responding to a position mentioned in the Plenary I session. The statement implied that no missions currently envisioned by NASA required nuclear systems other than current radioisotope power sources. Dr. Howe countered by stating that the purpose of the Plenary II session was to demonstrate that, in fact, innovative use of nuclear technologies actually enabled new, unimagined missions to be considered. Dr. Howe then made a short presentation summarizing recent technological developments at the CSNR that epitomized this position. The CSNR has been pursuing development of a radioisotope powered Mars Hopper that can cover the surface of Mars in three years, a nuclear rocket powered Mars Sample Return mission that could return 100 kgs of samples, and a new encapsulation technique for advanced radioisotope power sources.

Dr. McNutt gave a summary of his activities on the Messenger mission to Mercury. He also identified other future missions requiring higher power levels than previously available. Dr. McNutt also focused on the impending lack of Pu-238. He pointed out that if the US does not start Pu-238 production soon, then missions beyond Jupiter and solar missions would not be possible.

Ms. Clark gave a summary of recent outer planet missions and the scientific results that were generated. She also detailed enhanced science that could be provided by higher power levels.

Dr. Ambrosi represented the European perspective for upcoming missions. The European Space Agency has expressed interest recently in developing their own radioisotopic power sources—probably using Americium-241 as the isotope. Dr. Ambrosi also detailed a joint study with the EADS Astrium Corp. to design an alternative

Mars Hopper. The Leicester Hopper design diverged from the CSNR Hopper in that the platform was significantly larger and the range shorter.

In general, all the speakers agreed that the coming shortage of Pu-238 was a major issue that needs to be addressed by the US. This topic was discussed in a panel session within the Radioisotope Power Systems track. For a detailed summary of that session and to download the corresponding presentations, go to **Track III Panel Session: Pu-238 Supply and Production**. In addition, all Plenary II speakers showed that new capabilities for science and exploration could be enabled by innovative nuclear technologies.