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## Exploring Mars and Beyond: What's Next For U.S. Planetary Science

## Witnesses

Jim Green

Planetary Science Division Director, Science Mission Directorate, National Aeronautics and Space Administration Steve Squyres

Chair, Committee on the Planetary Science Decadal Survey, National Academy of Sciences and Goldwin Smth Professor of Astronomy at Cornell University

Subcommittee Members Present Stephen Palazzo, Chair (R-MS) Donna Edwards, Ranking Member (D-MD) Sandy Adams (R-FL) Lamar Smith (R-TX) Dana Rohrabacher (R-CA) Mo Brooks (R-AL) Marcia Fudge (D-OH)

*Full Committee Member Present* Ralph Hall, Chair (R-TX)

On November 15, 2011, the House Committee on Science, Space and Technology Subcommittee on Space and Aeronautics held a hearing to receive testimony from the National Aeronautics and Space Administration (NASA) and the National Academy of Sciences (NAS) on the prospects for future exploration of Mars and implications of the current fiscal crisis to the future of U.S. planetary science. NASA is scheduled to launch on November 25, 2011 the Mars Space Laboratory (MSL), a medium-sized rover that will conduct a number of geological, atmospheric, and chemical tests on the surface of the planet, and has follow-up Mars missions set for 2016 and 2018 planned jointly with the European Space Administration (ESA). The uncertainty of budget discussion between the administration and NASA for fiscal year 2013, however, has caused worry that the future Mars missions will not be accomplished. ESA might look instead to Russia for collaboration if NASA's future planetary missions remain uncertain. The NAS's most recent planetary decadal survey, *Visions and Voyages for Planetary Science in the Decade 2013-2022*, released in the spring of 2011, has made a number of budgetary recommendations to NASA and laid out a robust program with relative priorities for the agency's top flagship space missions. A representative from the Office of Management and Budget (OMB) was invited to testify at the hearing but declined to attend.

Chairman Stephen Palazzo (R-MS) discussed the necessity to "maintain a vital national space program" in his opening statement. He told the committee that the decadal report selected a Mars sample-caching mission as its top priority, the first of a three-step mission to collect soil samples from Mars and support the science for future missions. The chairman described the partnership with ESA as a result of the costliness of the top priority missions. He expressed worry that if "these internal conflicts aren't soon resolved," NASA may not be a reliable international partner.

Ranking Member Donna Edwards (D-MD) told the committee that the U.S. is the "undisputed leader" in space exploration and the nation's Mars program is "the envy of the world." She worries that the U.S. may not continue to be the leader in space if the internal budget issues are not sorted out. She said NASA needs to locate \$1.2 billion in its budget in order to keep the construction of the James Webb Space Telescope on target. Edwards asked the panel if NASA has a credible plan for its Mars program, what is preventing it from going forward, and what is needed from Congress to move things along.

During his testimony, Jim Green said NASA takes the decadal planetary survey very seriously because it provides an "indispensable" broad national science community consensus on the state of the science, the questions to be addressed, and a prioritized list of candidate actions and mission concepts to be pursued or studied over the next decade. He told the committee that

the Mars 2018 rover is NASA's highest priority, but can only be accomplished if NASA lowers the costs below \$2.5 billion, according to the decadal survey. Green emphasized NASA's collaboration with ESA to find a priority flagship mission. Steve Squyres said in his testimony that NASA has followed all of the recommendations put forth by the NAS except for the implementation of large flagship missions, which he said are an "essential part of a balanced mission," of which the Mars sample collection mission is the highest priority. While the guidelines in the survey are sufficient to carry out a partnership with ESA, Squyres stated the administration has not accepted this partnership.

During the question and answer period, Palazzo asked Squyres what dangers the U.S. would face if NASA loses its capability to run flagship programs due to a lack of funding and support from the administration. He responded that there would be a "severe" danger to planetary science in the U.S. because the nation would completely lose those programs and there would be no prospects for doing similar science in the future. When asked why NASA is not implementing the flagship mission priorities, Squyres replied, "I'm perplexed." He added that NASA has totally restructured its budget and revamped its designs with ESA since the survey release, but there is not yet a "commitment being made" by the administration to move this forward. Green pointed out that OMB has not yet notified NASA of any plans to cancel the Mars 2016 and 2018 missions. "We are eagerly awaiting the results from OMB," said Green, referring to the budget priorities. Lamar Smith (R-TX) asked Squyres if he thought the administration's priorities are the same as the general science community's priorities. He replied that the priorities differ in that, though NASA has worked "heroically" to lower budget profiles, there is still an unwillingness within the administration to commit to the flagship missions.

Edwards asked Green if OMB reviewed and approved his testimony, to which he replied that they had. She requested that Green respond to Squyres' statement that NASA is not dedicated to the partnership mission with ESA. He replied that their approach is to "continue in good faith" until OMB gives them more information. He stressed that NASA and ESA want to complete their mission. In response to a question from Marcia Fudge (D-OH) about NASA's mission prioritization options, Green replied that ESA is "an outstanding partner," and the reason NASA is currently able to prioritize its missions. Palazzo wondered if Squyres had noticed any "growing unwillingness" from international agencies like ESA during their dialogue regarding the partnership. Although he has sensed some frustration, he said the majority of their discussion has been very enthusiastic.

Smith asked the panel if they think NASA will find "microlife" on either Mars or Europa. Squyres said, "I simply don't know," to which Green agreed. Mo Brooks (R-AL) brought up the low plutonium-238 supplies for space program missions, asking Green which missions will be in jeopardy without additional fuel production. Green listed NASA's Discovery Mission, the Mars Science Lab, the Mars 2018 mission, and the New Frontiers program. He noted that no new facilities have been developed to produce plutonium, but NASA is aware of the need to begin production within "the next several years" because of the long lead-time needed to produce plutonium-238. Brooks asked about the start-up costs of plutonium production, to which Green estimated costs of between \$70 to \$90 million. Sandy Adams (R-FL) wondered if the Mars sample collection mission is crucial for the future of human missions. Green said that NASA will not be able to send humans to Mars without first obtaining the soil samples. Squyres added that if the U.S. is not able to accomplish its soil collection missions, "cutting-edge science" in the U.S. would suffer and the nation would be "poorly positioned" to plan future missions.

Dana Rohrabacher (R-CA) pointed out that the original budget for the James Webb Space Telescope was \$1.6 billion, whereas it is now \$8.8 billion. He argued that these "huge cost overruns" have forced NASA to collaborate with ESA, when we should be able to accomplish our missions independently.