

INFORMAL SCIENCE EDUCATION + PLANETARY MISSIONS = INCREASED PUBLIC SUPPORT AND SPACE SCIENCE LITERACY

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Introduction: Planetary missions provide a natural link and a ready-made audience for successful science education public programming. Planetary missions provide exciting science, but it can be difficult science for the general public to fully understand. Missions are large-scale and long-term projects that unfold over a long time period, during which the news media and the public may lose interest or forget past accomplishments. Data derived from planetary missions is presented as maps, graphics, annotated color-coded images, lists of chemical compositions, and 3D visualizations, all of which are difficult for the non-scientist to interpret. Planetary missions, by their very nature, include many different scientific disciplines, integration of many different types of data, and many different scientific “languages” used to describe new discoveries. The deeper connections between “sound bite” discoveries and solid scientific understanding are frequently missed by the non-scientist public. People are interested in planetary missions, but they do not always understand what it takes to do a mission, why we do it, how to interpret the data, and what is ultimately learned.



Scientific Literacy: Where can the public go for this type of information about planetary missions? Education/Outreach from NASA and affiliated research centers, including web sites, provide extremely useful and abundant information. However, not everyone has the tools or knowledge to access this information. And if they do, there is a wide range of information available on the web – they may not know which sites to access. Many mission scientists are “just

down the street” in many communities, at local research facilities and universities, but many members of the general public are intimidated by such facilities and don’t know where to go or who to contact. Special NASA publications, books by scientists and engineers, and “coffee table” compilations of selected images are usually produced after a mission, but may have limited publication or distribution. Most members of the public receive their information about planetary missions from the news media. While many journalists are interested in science and expert at translating the latest science, by its very nature, “new” news replaces long-term mission discoveries after the first few weeks of many missions.

Informal Science Education: However, there is a powerful and useful source for science information that provides a direct connection between planetary missions and the public. This source includes museums, science centers, nature centers, visitors centers, and even libraries and community centers. These facilities provide informal (outside of the formal classroom) science education and they serve a wide and diverse audience. In fact, they are perceived by their community as trusted local sources for reliable science information, accessible and non-threatening, and serving the entire community from pre-K through Senior Citizen, including underrepresented audiences. They are particularly important for smaller communities or rural areas that may not have other science resources. Because of their diverse audience, museums and other informal science education facilities have a flexibility of approach in teaching and reaching the public that is not commonly found in formal educational settings. They also have a graphics/display expertise that allows them to present complicated science in easy-to-understand exhibits. These facilities provide a perfect link between the mission scientist and the public, and except in the case of NASA-related visitors centers, are frequently underused by planetary mission personnel.

Face-to-Face Connection: There are local community museums, science centers, and libraries everywhere, and they can provide public education expertise to the planetary scientist. Most importantly, they can make a face-to-face connection between the public and their local planetary scientist/engineer. Putting a “human face” on science is especially important for forging a personal connection with the public and a long-term and high-tech planetary

mission. Museums/science centers and other similar facilities can provide the link between scientist and public in order to answer questions such as “who are the people who become scientists and engineers? what type of people make a major planetary mission work? what do they do and why do they do it?” The face-to-face connection provides an opportunity for the public to see the diversity of people and professions that work together to make a mission a reality and to increase support of missions through “hometown pride” of local scientists and engineers involved in a great endeavor.

Learning in Museums: Research on learning in museums/science centers [1] shows that visitors are a self-selected audience who are interested in learning, but are also self-directed and not a “captive audience.” They spend minutes rather than hours at a given exhibit so exhibits must be interesting and easy to understand. Most learning takes place in families or multi-generational groups so exhibits must be able to educate both adults and children. Most visitors are repeat visitors and life-long learners; they want new information each time they visit. The museum/science center advantage is in object-based and experiential learning; for example, seeing the “real thing” such as a lunar sample or full-scale rover or being immersed within a particular planetary environment. The design and creation of successful exhibits requires collaboration between scientists, educators, exhibit designers, fabricators, and artists, as well as front end, formative, and summative evaluations. Successful exhibits must be carefully designed to support multiple learning styles.

Interest in planetary missions can be used as a “hook” to teach a wide range of topics. Museums/science centers can aid in public understanding of the science derived from planetary missions and in public support of such missions.

A 21st Century Natural History Expedition: An example of planetary mission-related public programming has taken place over the past three years at the New Mexico Museum of Natural History and Science. The Mars Exploration Rover Mission (MER) has been used as the basis of a major exhibit (now permanent), targeted educational programming, and an integrated curriculum for K-12 teachers.

The New Mexico Museum of Natural History and Science (NMMNHS) is a statewide institution, part of the New Mexico Department of Cultural Affairs, and serves a regional population that includes 38% Hispanic and 9% Native American, as well as a high percentage of rural communities. For space-related topics, the NMMNHS has partnered with the LodeStar Astronomy Center (LodeStar), a University of New Mexico community outreach project with facilities and planetarium located within a wing of the NMMNHS.

NMMNHS/LodeStar became the local source in New Mexico for information about MER and Mars. NMMNHS/LodeStar facilitated 21 TV news stories (on all 5 local stations), 8 local radio interviews, 30 New Mexico newspaper stories, and 5 local magazine stories. NMMNHS/LodeStar partnered to create a unique and complete MER and Mars exhibit and, throughout the past three years (December 2003 through December 2006) created and provided a complete range of MER-related and Mars related outreach and educational programs. Many of the Mars public events were “standing-room only.” The *Making Tracks on Mars* exhibit has been viewed by over 450,000 visitors (including 40,000 visitors in southern New Mexico during its appearance as a exhibit loaned to the New Mexico Museum of Space History (in Alamogordo, NM). It is now a permanent exhibit at the LodeStar Astronomy Center, and has been highlighted on the NASA Education Portal web site [2].

Mars themed educational programming (Family Days, Public Lectures, Student Programs, Public Events, and K-12 Teacher Professional Development workshops held throughout the state) reached an additional 5000 participants.

A complete curriculum entitled “*Making Tracks on Mars Teacher Resource and Activity Guide*,” available on CD and on the website [3], has been an outgrowth of the exhibit and educational programming. Recently, the curriculum passed the NASA review for educational products with overall rating between Very Good and Outstanding and has been recommended for national distribution.

[1] Falk, J.H. and Dierking, L.D., 1992, *The Museum Experience*, Whalesback Books, 205 p.; Hooper-Greenhill, E., 1994, *The Educational Role of the Museum*, Routledge, 340p.; Mayer, S.M., Informal learning and teaching in *Patterns in Practice*, *Journal of Museum Education*, 1992, p.243.

[2] Hitt, D., 2006, http://www.nasa.gov/audience/foreducators/informal/features/F_Making_Tracks_on_Mars.html

[3] Aubele, J.C., et al, 2006, “*Making Tracks on Mars Teacher Resource and Activity Guide*”

<http://164.64.119.7/nmmnh/marsmer/MakingTracksMars/start.html>

