INCREASING SCIENCE LITERACY AND PUBLIC SUPPORT FOR PLANETARY SCIENCE: MER MUSEUM EXHIBITS, EDUCATIONAL PROGRAMMING AND PUBLIC OUTREACH AT THE NM MUSEUM OF NATURAL HISTORY & SCIENCE AND LODESTAR ASTRONOMY CENTER. J.C. Aubele¹, J.A. Stanley², J. Aragon³, A. Grochowski¹, K.L. Jones⁴ and L.S. Crumpler¹

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Introduction: “Space-related” science is one of the three favorite science topics cited by students; and “space-related” science can be the basis of an integrated curriculum that includes study of all of the sciences, mathematics, social studies (history and exploration), science and society, career readiness, language and literacy, and visual arts. For the general public, planetary missions spark interest and questions and provide a natural link and ready-made audience for successful public programming.

The New Mexico Museum of Natural History and Science (NMMNHS) was one of only two museums nationwide with a direct link to the MER mission through a science team member. The mission of the NMMNHS is to pursue scientific research, develop focused collections and present innovative and engaging educational exhibits and public programs to promote science literacy. The 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, and therefore reaches an audience traditionally underrepresented in science. For space-related topics, the NMMNHS has partnered with the LodeStar Astronomy Center, a University of New Mexico community outreach project.

Making Tracks on Mars: Because of the direct connection to the MER mission through a science team member, the NMMNHS/LodeStar was able to act as the local and regional source for information about the mission and about Mars. The NMMNHS/LodeStar facilitated 17 TV news stories (on all 5 local stations), 5 local radio interviews, 26 New Mexico newspaper stories, and 4 magazine stories. The NMMNHS/LodeStar created and provided a complete range of MER-related outreach and educational programs targeted to teachers, students, families, and the general public. Public programming included the creation of a unique exhibit, production of a Mars planetarium show, a Mars mission simulator experience, and Mars evening programs. Educational programming included teacher workshops (including participants from rural and Native American communities statewide), Mars Family Days, and lectures, presentations and special events.

With the New Mexico MER science team member as a mentor, and the support of the NMMNHS/LodeStar educators, New Mexico was able to participate in the ASIP (Athena Student Intern) Program. Our student/teacher intern team consisted of teacher Joe Aragon (Acoma Pueblo), and students Jay Herrera (Laguna Pueblo) and Mark Vallejos (Seboyeta, NM). The NM-ASIP team worked with the Museum educators, made outreach presentations and helped to teach Museum visitors.

The NMMNHS/LodeStar produced a full MER exhibit entitled “Making Tracks on Mars” that was on display in Albuquerque and then traveled to the NM Museum of Space History/Space Hall of Fame in Alamogordo. The exhibit was funded by local and regional donors and businesses and incorporated the following: (1) the most detailed full-scale model of the rover outside of JPL (built by Museum volunteers from plans provided by JPL), (2) a full Marscape (with appropriate regolith and rock population and background mural painted by a local artist), (3) information about the planet, about the mission and about the rover in a series of kiosks with hands-on interactive stations designed and built by the Museum, (4) touchable JSC-1 Mars simulated soil, and (5) a display of daily images received through our membership in the Mars Museum Visualization Alliance. While the exhibit was on display (from December 20, 2003 to June 30, 2004) in Albuquerque approximately 160,000 visitors saw and interacted with the exhibit, attended Mars-themed planetarium shows or experienced the Mission to Mars Simulator.

The NMMNHS/LodeStar provided targeted educational programs specifically for teachers (3 half-day or full-day workshops), students (classroom outreach programs and Mars-themed week-long summer programs), families (4 “Mars Family Days” with hands-on activities to promote family learning), and the general public (31 lectures, presentations and special events) reaching 3800 participants with targeted educational programming. We also hosted one of the national Marsapalooza events, courtesy of Passport to Knowledge, with funding and support from NSF, JPL, ASU and Mars Education Coordinator Sheri Klug.
As a permanent educational product, the NMMNHS/LodeStar has produced a complete “Making Tracks on Mars: Teacher Resource and Activity Guide” with science content information and 18 new or MER-adapted hands-on activities suggested for grade levels 3-9.

The Museum/Planetarium Advantage:
Informal science education centers have the following advantages: (1) graphics/display expertise; (2) flexibility in approach and programming; (3) family learning opportunities; (4) audience ranging from pre-K through Senior Citizen; (5) accessible, visitor-friendly and non-threatening resource site for science information for the community.

The general public is interested in space-related science and mission information; however, most people don’t know how or where to obtain this information. There is too much information, of unknown validity, on the web and too little, in many cases, in the news media. Community members are frequently too intimidated to walk into their local university department. Museums provide concise, factual, reliable, and entertaining presentations of the relevant information. It is not enough to simply report on the mission, museums educate through object-based learning and experiential learning. By emphasizing the local connection, we became a site for people to link with the mission through a local scientist and to make a personal connection to the mission and its discoveries.

K-12 teachers also need a resource for reliable information and are able to make use of Museum and planetarium programs and objects to provide a “real world” approach to science in the classroom. NMMNHS/LodeStar expertise was used to sift through the abundant materials available and provide teachers with a comprehensive, pre-selected set of concepts, and grade and age appropriate activities, while at the same time teaching the content to the teachers in a developmentally appropriate way. This has become particularly important in addressing the requirements of “highly qualified” teachers as mandated by the “No Child Left Behind” legislation.

The teachers took their NMMNHS/LodeStar experience back to their classrooms. In one multi-grade elementary classroom, the teacher reconfigured the entire curriculum and related every subject taught during the year to Mars. This type of innovative education leads back to the general public and lends itself to collaboration with community groups and organizations such as local astronomy clubs, engineering companies, and high tech industries.

Lessons Learned: The NM Museum of Natural History/LodeStar Astronomy Center created an extensive and interrelated number of MER public and educational programs. Our MER education and public outreach was successful for the following reasons: (1) we promoted and emphasized the local connection (in our case a New Mexico scientist on the mission team and an NM ASIP team) to allow the public to feel connected, proud and involved; (2) we met community needs and expanded participation by partnering with other science education providers and school districts (our teacher partners included those from NM MESA, a statewide organization that encourages underrepresented minority participation in science and engineering); (3) we created our own programs specifically linked to MER and used the southwest region as an analog to Mars, however we did not “reinvent the wheel”, whenever possible we adapted ideas from the abundant and excellent resources of NASA, JPL and ASU; (4) we utilized our resources and expertise (our local volunteers consisted of engineers, machinists, model builders so that we were able to build a replica of the rover and we had the resources to produce a one-of-a-kind exhibit); (5) we involved elementary through high school classroom teachers in the development of our MER educational programs and materials (the teachers provided a bridge between informal and formal educational needs, knew the relevant standards, benchmarks and formal requirements, and reached out into their school and their community by sharing these resources and their excitement with their colleagues and communities.

Full-scale replica of MER rover built by Museum. Centerpiece of the “Making Tracks on Mars” exhibit at the New Mexico Museum of Natural History and Science, Albuquerque, New Mexico.