

**PUBLIC OUTREACH AND EDUCATION WITH METEORITES INVOLVING A MUSEUM EXHIBIT, WEBSITE, AND TEACHER WORKSHOPS.** M. L. Hutson<sup>1</sup>, R. N. Pugh<sup>1</sup>, and A. M. Ruzicka<sup>1</sup>, <sup>1</sup>Cascadia Meteorite Laboratory, Portland State University, Dept. of Geology, 1721 SW Broadway, 17 Cramer Hall, Portland, OR 97207, e-mail: mhutson@pdx.edu.

**Introduction:** In 2003, members of the Cascadia Meteorite Laboratory (CML) were awarded a NASA Education/Public Outreach grant as an addition to a research grant. The goals of the E/PO were to increase knowledge about meteorites among both the public and K-12 teachers and students. Four activities were proposed to achieve these goals: 1) a permanent meteorite exhibit at a local museum; 2) an educational web site; 3) workshops for K-12 teachers to be held during two consecutive summers; and 4) lectures to the general public. As of December 2005 members of CML have spoken to over 6000 people, including the public, teachers, and K-12 classes. An estimated 9000 students have visited the museum exhibit we designed. Some of our proposed activities were more successful than we expected, while others required rethinking and restructuring. Here we pass on some of the lessons learned along the way.

**Museum Exhibit:** On July 17, 2004, a colorful and informative exhibit on meteorites opened at the Rice Northwest Museum of Rocks and Minerals in Hillsboro, Oregon. The museum is open to the general public during afternoons and runs tours for K-12 classes during mornings. At the time of the exhibit opening, the museum estimated that roughly 6000 students per year were visiting the museum, with about 40% coming from outside the Portland metropolitan area. This was an example of an activity that went far better than planned. The museum paid for the construction and lighting of the display areas. E/PO funds were used to purchase some museum quality meteorite specimens and to print the panels that line the back of the display cases. We were only able to afford only a small number of good quality specimens, but were able to solicit donations of additional meteorite samples, including a slice of a lunar meteorite. The panels were designed to appeal to a wide range of age groups. Small children can focus on the stories told by the abundant illustrations. Text and figure captions provide additional information geared towards middle and high school students and adults. We have received positive feedback from the museum personnel, museum visitors, and undergraduate students working as docents at the museum, that the exhibit is very successful. Figure 1 below shows a typical panel from the exhibit (left) with meteorite samples in front of the illustrated information. The right side of Fig. 1 shows

a classroom of students on tour looking at a portion of the exhibit.



**Educational Web Site:** This an example of an activity that went slower than expected due to the nature of the activity. Some of the E/PO funds were used to pay an educational software specialist for assistance with an interactive on-line exercise in identifying meteorites. The software specialist is a geologist, but knows almost nothing about meteorites. For the last six months the exercise has gradually been taking shape through a series of meetings and e-mail exchanges. As an example, in one e-mail discussion we had to explain that the fusion coating on an iron meteorite was not technically a "silver-gray material with a metallic luster". At the time this abstract was written, the exercise was starting to take final form, and it is expected to be up and running by March 2006. The interactive activity can be accessed from the CML web site at the following URL: <http://meteorites.pdx.edu/>

**Teacher Workshops:** Giving workshops for educators is where we went farthest afield from our original plans. When we originally proposed this project, we had an education partner who was the executive director of an organization that facilitated programs supporting underrepresented students in math, science, and engineering. He was supposed to help organize teacher workshops, but abruptly quit his position shortly after we received funding. We spoke to the science coordinators at the Portland metropolitan area schools and were told that they already had programs for teacher workshops in place and would prefer that we work within those programs. Consequently, we decided to work within the system that was already established by Portland Public Schools (PPS), rather

than try to attract teachers to a venue at Portland State University as originally proposed. The existing PPS summer workshop program attracts teachers who need to earn required proficiency credits. None of these workshops attracted large numbers of teachers, however, so we tried alternative ways of reaching teachers and their students by approaching other educational entities in the state of Oregon. We held a teacher workshop at a meeting of the Oregon Science Teachers Association, and have done lectures/demonstrations for two years in a row at the Oregon Academy of Sciences meetings. We also took advantage of the fact that an international science fair (Intel ISEF) was held in Portland in 2004 to set up a display table. The display consisted of a section of real meteorites, and a test where real meteorites were mixed together with terrestrial samples. Students had to compare the unknowns to the known meteorite samples to make a determination. We were told by a conference coordinator that polls of students showed our exhibit to be one of the most popular at the science fair. As a result of contacts with teachers at this fair, CML personnel were invited to give talks to individual classes and assemblies at seven middle and high schools in the Portland area. Also, we were invited to repeat this display at a regional science fair in 2005, where we met people involved in the Libraries of Eastern Oregon (LEO) Program. This program is designed to bring science lectures to rural Oregon. LEO arranged to have Richard Pugh (CML member) visit from one to five small towns on a given tour, speaking to one or more classrooms during the day and a library during the evening in each town. LEO paid part of the costs and our E/PO helped to supplement these costs. This has been an extremely successful endeavor. We have found that visits to small towns often get reported prominently in the local newspaper, attracting large crowds to the libraries.

**Lectures to the General Public:** The museum exhibit and the newspaper articles accompanying various events have led to wide visibility for CML. Consequently, members of CML were asked to give lectures to diverse public organizations. These included giving classes at Mt. Hood Community College and Oregon State University. We also lectured to the following organizations: the USGS at Oregon City, Sherwood Rotary Club, Oregon Museum of Science and Industry, Columbia Gorge Museum, Oregon City Rotary Club, Sigma Xi, the Cambrian Society, the Geological Society of the Oregon Country, Rose City Astronomers, the Oregon Star Party, GemFaire, the Ice Age Institute, the Milwaukie Gold Prospectors Society, and even the Bigfoot Society. Figure 2 (below) shows Richard Pugh (left) during the "hands-on" event

following a lecture at the Oregon Museum of Science and Industry.



**Lessons Learned:** The goal of this E/PO was to educate as many people as possible about meteorites through a variety of venues. We particularly wanted to reach K-12 teachers and students. We had a vision regarding how we would go about our tasks. Reality was often in stark contrast to this vision. The museum exhibit most closely matched our vision because it involved only CML personnel and the museum curator, who did not need any special knowledge about meteorites to complete his part of the task. The web site development went slower than expected because it involved educating the software designer about meteorites, and in aligning his vision with ours as to the design of the exercise. We were expecting to attract teachers to workshops at Portland State University, in part by giving them incentives such as stipends and free materials. However, we found that teachers already have a variety of workshops and educational events that they are expected to attend as part of their jobs. We had to accommodate the needs of the teachers by going to them, rather than having them come to us. Finally, as far as outreach to the general public is concerned, we found that the key ingredients of success were to be flexible and to take advantage of contacts made at different events. The main lesson learned from this E/PO effort was that a flexible multi-pronged approach builds upon itself and ultimately can reach large numbers of people.

**Acknowledgment:** This work was supported by an E/PO supplement to NAG5-13044.