

**LESSONS LEARNED FROM METEORITE PUBLIC OUTREACH AND EDUCATION IN THE PACIFIC NORTHWEST.** 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, Department of Geology, 1721 SW Broadway, 17 Cramer Hall, Portland OR 97201. E-mail: cmlpsu@pdx.edu.

**Introduction:** Since its inception in 2002, personnel of the Cascadia Meteorite Laboratory (CML) have striven to engage educators and laypeople in space science topics by pursuing a vigorous outreach effort. Three programs funded by NASA have included: 1) Public outreach and education with meteorites involving a museum exhibit, website, and teacher workshops; 2) Meteorites on the Road: Taking Meteorite Science to Rural Communities; and 3) Meteorites on the Road, II: Expanding NASA Outreach in the Pacific Northwest. In this abstract, we reflect on lessons learned as a result of over ten years of informal education and public outreach.

**Project 1: Meteorite Display, Website, and Teacher Workshops:** The first project involved three separate outreach activities: a meteorite display at the Rice Northwest Museum of Rocks and Minerals in Hillsboro, Oregon, a website with an interactive meteorite identification exercise, and teacher workshops in partnership with Portland Public Schools (PPS).



Fig. 1. Children in front of the meteorite display at the Rice Museum in Hillsboro Oregon.

*Lesson 1: Teacher workshops can be ineffective.* Few teachers attended the workshops we set up with PPS. We discovered via questionnaires that teachers felt overloaded with mandatory workshops, and did not want to use their limited free time to attend informational workshops on space science.

*Lesson 2: Websites can generate interest, but people skip most of the information on a web site when browsing.* Once the website went “live”, lab personnel began receiving numerous e-mails and phone calls.

However, it was clear that many people had not read through the website, as they would ask questions which were answered there.

*Lesson 3: Museum displays can interest the public, but have limited reach.* The meteorite display was created and placed in the entryway of the Rice Museum over ten years ago (Fig. 1). The museum is a popular destination for Portland-area school children. The display is judged to have been a successful outreach effort, based on feedback via questionnaires developed by the museum. A drawback is that the display mainly attracts people from a geographically limited area (metropolitan Portland).

**Project 2: Meteorites on the Road I and II:** Based partly on lessons learned from Project 1, we decided to take space science to teachers in their classrooms, and to the public at large. Eastern Oregon was chosen as the main venue because we were able to partner with Libraries of Eastern Oregon (LEO), because communities are separated by large distances, and because per capita income in these rural areas is low, precluding easy access to scientific lectures and educational opportunities.

We created several Powerpoint presentations, including a basic 45 minute presentation on asteroids, meteors, impact craters, characteristics and types of meteorites, and meteorites of the Pacific Northwest. We purchased samples to create a teaching collection of approximately 30 kg of chondrites, achondrites, stony-iron and iron meteorites to allow people a hands-on experience (Fig. 2) where they could test samples by heft and with a magnet, and compare the meteorites with terrestrial rock samples. CML staff member Dick Pugh drove long distances on multi-day tours to present the lab’s outreach program at schools during the day and at community centers (libraries, grange halls, churches, saloons, etc.) in the evening or on weekends. Over 27,000 miles were logged, and roughly 7,000 school children and 6,000 adults participated in the events.

*Lesson 4: Taking a meteorite program directly into the heart of rural communities made a big splash.* We received comments on questionnaires indicating that people often drove long distances to attend presentations, and other comments indicating that attendance was high for the venues. Local newspapers often made the presentation by Dick Pugh a front-page story.



Fig. 2. Students at a reservation school near Kennewick Washington in 2012, examining meteorites.

*Lesson 5: There is significant public interest in meteorite identification and discovery.* Attendees were encouraged to bring suspected meteorites to events. Approximately one out of six attendees brought a suspected meteorite for identification. Numerous questions from the audience about “meteorite hunting” were asked.

*Lesson 6: There are real meteorites among rocks held by the public, but many more that are not.* Of the 2435 specimens examined, most were terrestrial materials, with the most abundant “meteor-wrongs” being basalt, slag, manmade iron, and fulgurites (in that order). 119 specimens were real meteorites, albeit already classified ones, such as the Canyon Diablo iron meteorite. Four samples turned out to be new meteorites, and were classified by CML personnel: Morrow County (L6) (Fig. 3) and Fitzwater Pass (IIIF iron) from Oregon, and Diamond Valley 002 (H6) and Diamond Valley 003 (H6) from Nevada.

*Lesson 7: With diverse audiences, it is difficult to obtain rigorous quantitative assessment of program effectiveness, but relatively easy to obtain useful qualitative data.* Audiences ranged from preschoolers to senior citizens, and spanned a wide variety of ethnicities and economic and educational backgrounds. With this diverse mix, it was impractical to attempt pre- and post-tests to gauge program effectiveness. However, we found that we could obtain useful data by having

the “lead contact” (teacher or librarian) at each venue complete a questionnaire consisting of questions about the perceived quality of the presentation, including the most and least effective aspects for the audience, whether the event generated any local media coverage or stimulated people to bring rocks (candidate meteorites) to the event for inspection, and a question about the number of attendees. We included a self-addressed stamped envelope to encourage responses.

**Conclusion:** What we’ve learned in aggregate is that the most effective outreach has to fit the audience and venue. There is no “one size fits all” or perfect public outreach program. In a metropolitan area, a museum display can be successful but will mainly draw a local audience. Public talks about meteorites in an urban setting are unlikely to draw large crowds, however, as they compete with a huge variety of other entertainments. Rural communities have fewer distractions, so a presentation can become a big event and draw from geographically large area. But to reach populations in rural settings requires travelling large distances to speak to small groups.



Fig. 3. Mr. Donald Wesson (finder), with the ~18 kg Morrow County, Oregon L6 chondrite.

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