

BRINGING YOU THE MOON: LUNAR EDUCATION EFFORTS OF THE CENTER FOR LUNAR SCIENCE AND EDUCATION. A. J. Shaner^{1,2}, C. Shupla^{1,2}, S. Shipp^{1,2}, J. Allen^{1,3}, D. A. Kring^{1,2}, E. Halligan^{1,2}, K. LaConte^{1,2}, ¹Center for Lunar Science and Exploration, ²Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston, TX 77058, shaner@lpi.usra.edu, ³NASA Johnson Space Center, Houston, TX.

Introduction: The Center for Lunar Science and Exploration (CLSE), a collaboration between the Lunar and Planetary Institute and NASA's Johnson Space Center, is one of seven member teams of the NASA Lunar Science Institute. In addition to research and exploration activities, the CLSE team is deeply invested in education and public outreach. Overarching goals of CLSE education are to strengthen the future science workforce, attract and retain students in STEM disciplines, and develop advocates for lunar exploration.

The team's efforts have resulted in a variety of programs and products, including the creation of a variety of Lunar Traveling Exhibits and the High School Lunar Research Project, featured at <http://www.lpi.usra.edu/nlsi/education/>.

Traveling Exhibits: The CLSE team has created over half a dozen exhibits available for loan to organizations across the United States. Designed for libraries, these banners use colorful images and text to share current lunar science and exploration stories. The displays can be used to excite and engage patrons in further exploration through library resources and programs.

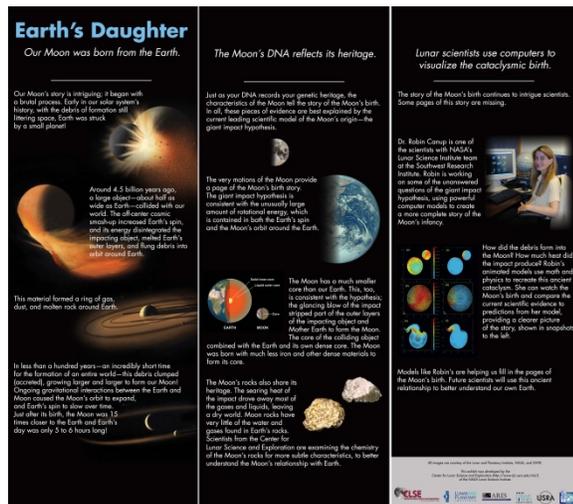


Figure 1. The Earth's Daughter lunar traveling exhibit covers the formation of the Moon.

Exhibit topics include the Moon's formation, the lunar cataclysm hypothesis, the role of lunar craters in decoding solar system history, the magma ocean, and the relationship between the late heavy bombardment

and the formation of life on Earth. Each topic uses an interpretive design to convey the scientific topic and the research that supports it, and features one or more scientists currently studying the topic (Figure 1). Several copies of each exhibits are freely available for loan over three month periods, for libraries, museums, and other public venues. The website also has full-sized graphics available for download, for institutions to replicate for themselves, and program ideas and resources that accompany each exhibit.

High School Lunar Research Project: This national project provides a standards-based, authentic research experience for secondary students. With the aid of a virtual scientist mentor, student teams undertake research projects that envelop them in the process of science while supporting the science goals of CLSE, in order to enhance student understanding of the nature of science, improve student attitudes toward science and science careers, and increase student knowledge of lunar science.

In the first step, known as Moon 101, students proceed through a guided inquiry activity to become familiar with the lunar environment and surface processes, and explore lunar science articles; the students then apply this knowledge by characterizing the geology seen in one of three pre-selected images of the lunar surface.

In the next step, students apply their understanding and skills to open-ended research projects, guided by a virtual mentor. At the close of the year, students present their research findings as a conference-style poster to a panel of lunar scientists. (Figure 2).

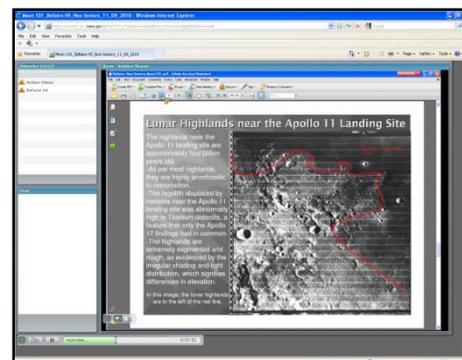


Figure 2. Students present their research findings over the Adobe Connect videoconferencing software.

This panel judges the presentations and selects four teams' posters -- those with the highest scores -- to be displayed at the annual NLSI Forum held at NASA Ames in July. These four posters further compete in the NLSI Forum Student Poster Competition. The CLSE high school team with the overall highest score is funded to attend the forum and present their work in person.

In addition to undertaking authentic research, teams interact with lunar scientists during monthly webcasts in which scientists present cutting-edge research and information about lunar science and careers. Through these multiple experiences, students gain ... CLSE staff assists interested students in making connections with lunar and planetary science faculty across the country.

Online Classroom Resources: The CLSE team also has created a variety of resources for use in high school and college classes, including illustrations (Figure 3), PowerPoint presentations, and an online cratering laboratory, that are available for use by teachers and professors. These can be downloaded for free classroom use at <http://www.lpi.usra.edu/nlsi/training/>.

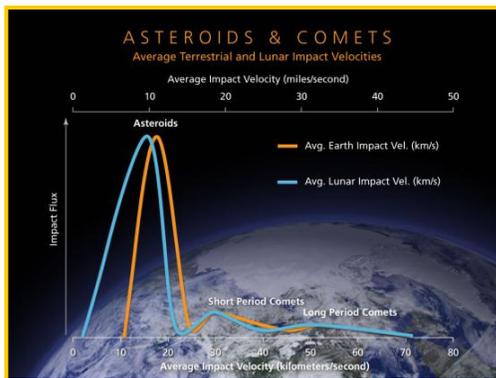
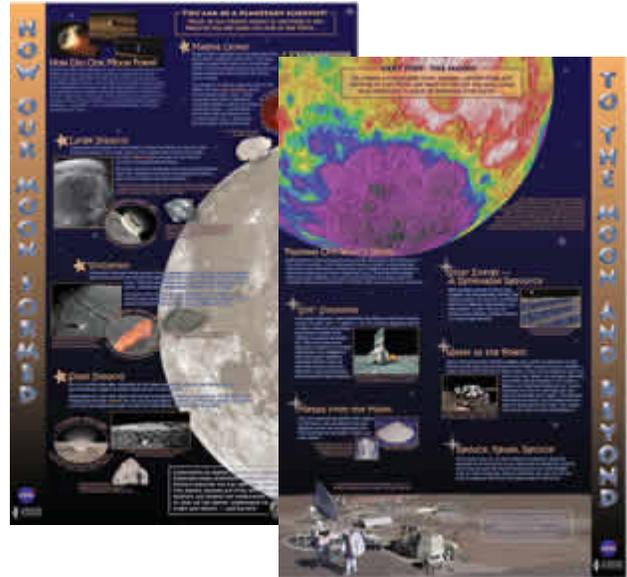


Figure 3. This illustration compares the average terrestrial and lunar impact velocities of asteroids and comets.

Material Resources: CLSE has produced colorful "Never Stop Exploring" cards featuring a myriad of lunar scenes. Team members also produced a lunar poster set for middle school science classroom teachers who have participated in lunar science professional development. These materials may be requested for appropriate use, at education@lpi.usra.edu.

Never Stop Exploring cards are available through the CLSE education team or for download from the website.



Lunar education posters are available for download at http://www.lpi.usra.edu/education/moon_poster.shtml

Additional Activities: CLSE team members collaboratively present a variety of lunar education workshops, working in conjunction with Johns Hopkins Applied Physics Laboratory's NASA Lunar Science Institute, with the Lunar Reconnaissance Orbiter's education team, with the Center for Lunar Origin and Evolution. They also partner in the International Observe the Moon Night events, sharing lunar science and activities with the public and providing resources for organizations around the world.

Additional Information: For more information about the CLSE education efforts, available resources, and evaluation, please go to <http://www.lpi.usra.edu/nlsi/education/> or email shaner@lpi.usra.edu.