THE EXPLORER'S GUIDE TO IMPACT CRATERS: AN INTERACTIVE WEBSITE AND ROCK KIT FOR OUTREACH AND PROFESSIONAL DEVELOPMENT WORKSHOPS FOR ELEMENTARY AND MIDDLE SCHOOL SCIENCE TEACHERS. S. K. Croft[1, 2]; E. Pierazzo[2]; T. Canizo[2]; L. A. Lebofsky[2], J.A. Palmero Rodriguez[2], [1]Science, Pima Community College, Tucson, AZ, USA (skcroft@pima.edu), [2]Planetary Science Institute, Tucson, AZ, USA (betty@psi.edu, lebofsky@psi.edu, canizo@psi.edu).

Introduction: Impact cratering is one of the fundamental geologic processes affecting all planetary and asteroidal bodies in the Solar System. With few exceptions, all bodies with solid surfaces explored so far show the presence of impact craters - from the less than 200 known craters on Earth to the many thousands seen on the Moon, Mercury, and other bodies. Indeed, the study of crater populations is one of the principal tools for understanding the geologic history of planetary surfaces. In recent years, impact cratering has gained public notoriety through its portrayal in several Hollywood movies. Questions that are raised after watching these movies include: "How often do impacts occur?" "How big can they get?" "How serious is the threat of Earth impact?" Those with some understanding of geologic processes might ask: "What information do impact craters provide in understanding the evolution of planetary surfaces?" On our website: "Explorer's Guide to Impact Craters," we answer those questions in a fun, informative and interactive way. The website provides the interested public with an opportunity to: 1) experience how scientists explore known terrestrial craters through virtual fieldtrips; 2) learn more about the dynamics of impact cratering using numerical simulations of various impacts; and 3) investigate how impact cratering affects rocks via images and hands-on experience with field samples of impact rocks. The "Explorer's Guide" has been a popular outreach tool, recently reaching 100,000 hits, and it is now available in both English and Spanish.

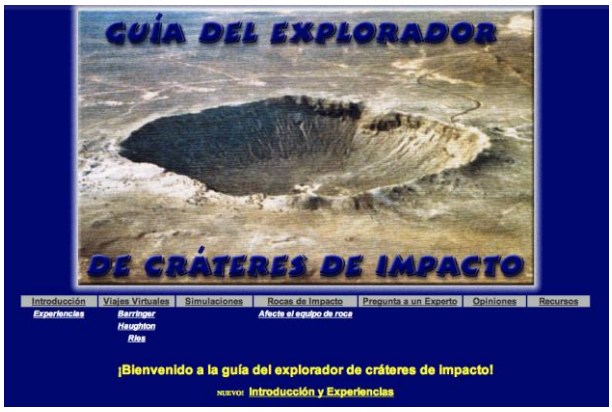

Fig. 1: Front page of the Spanish version of the Explorer's Guide to Impact Craters.

The Web Site. The main divisions of the "Explorers' Guide" web site are:

Introduction. Includes an extensive background presentation describing what craters are, how they form, where they are found on Earth, why scientists study them, and why understanding craters might be important to everyone on Planet Earth.

Virtual Tours. Detailed interactive tours of Barringer (Meteor) Crater in Arizona, Haughton Crater in Canada, and the Ries Crater in Germany are provided using multimedia at more than a dozen sites at each crater, including satellite and surface images, text, panoramic videos of most sites, and on-site video commentaries by experts in impact cratering.

Simulations. Computer simulations are provided for seven different impact situations of differing impactor size and velocity, and pre-impact surfaces (land, shallow sea, or deep ocean). Different colors are used to help viewers identify different types of impacted material (fractured, melted, vaporized).

Impact Rocks. This section provides images and descriptions of common types of impact rocks and where they are typically found in crater structures. Impact rocks are ordinary terrestrial rocks that have been affected by an impact event.

Ask an Expert. Viewers are provided email contact to have their budding questions about impact cratering answered by the experts.

Feedback. Here viewers may provide comments and suggestion on how the web site may be improved.

Resources. Provides links to some of the more useful and colorful external web pages providing information about craters and cratering.

The Impact Rock Kit. While the webs site provides virtual exploration of impact craters, nothing illustrates the effects of an impact event on the rocks like real samples. To enhance the exploration of impact craters, we have thus developed an Impact Rock Kit that allows teachers and students a hands-on experience with hand samples of impact rocks gathered at the Haughton and Ries during the field geologists' exploration of the craters. The Impact Rock Kits are accompanied by explanatory materials for each of the samples, and are thoroughly integrated with the science content on the web site. The Impact Rock Kits are available for check-out by teachers desiring to involve their students more deeply in the study of impact craters.

The Workshop. The "Explorer's Guide" and Impact Rock Kit have been incorporated in the Impact Cratering Workshop developed by scientists and EPO specialists at the Planetary Science Institute. The workshop provides elementary and middle school science teachers with an inquiry-based understanding of the process of impact cratering and how it affects the Earth and other bodies in the solar system. Participants are instructed via standards-based multimedia presentations, analysis of planetary images, hands-on experience with geologic samples from the Haughton and Ries impact craters described on the virtual field trips, and first-hand experience forming impact craters.

Further information about the Rock Kits and Impact Cratering Workshops can be obtained at:

http://www.psi.edu/explorecraters/

This work is supported by NASA Grant NNX06AB65G.

Fig. 2: During the *Impact Craters!* workshop, teachers learn about impact rocks by using the impact rock kits in combination with the virtual tours at the Explorer's Guide to Impact Craters.