

Exploring Planetary Surfaces: Earth, Moon and Mars

Rationale

In the recently released NASA Science Plan 2007 (<http://science.hq.nasa.gov/strategy/>) broad objectives for the agency, and particular for solar system exploration are articulated. The proposed research fits within the goals for Planetary Science: *Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space.* The abundance of new planetary data requires development of the next generation of investigators trained in both terrestrial geosciences as well as the interpretation of image and other data from NASA planetary missions. Synthesis of these complex data sets and preparing for future missions requires a new interdisciplinary approach. The Nevada System of Higher Education (NSHE) currently has a number of groups working on aspects of planetary surface processes, but these efforts are largely uncoordinated and lack critical mass. We will develop a center of excellence in planetary surface processes research and education by building on the existing strengths of NSHE researchers in the fields of advanced computer visualization and modeling, geomorphology, geology, microbiology, geochemistry, atmospheric, and hydrologic processes.

The proposed research, education, and capacity building activities will make full use of the unique desert environment of Nevada, a rich source of terrestrial analogue sites. We will link observational data on multiple scales with the perspective gained in the field for a comprehensive view of surface processes at several locations using an immersive visualization approach. Research and training activities will focus primarily on developing the next generation of researchers in the field of planetary surface processes. This will be conducted through mentoring of graduate students, as well as provision of resources to NSHE faculty to facilitate research and graduate education.

The proposed program has three main focal areas:

- (1) Data collection and synthesis for immersive visualization at two planetary analog sites, one at Lunar Crater Volcanic Field, NV and the second in the Mojave Desert. The development of a comprehensive database of remote and field data will allow students and researchers to interrogate data correlations across a variety of spatial scales and sensing techniques.
- (2) New field experiments at these analog sites, emphasizing links between the morphology, mineralogy and potential for life as well as aeolian processes and sediment transport which impact robotic traversability.
- (3) Expand application of the experience gained at the terrestrial sites to planetary exploration by applying immersive visualization routines to orbital and surface data acquired of the two Mars Exploration Rover landing sites.