RESTORATION OF APOLLO DATA BY THE LUNAR DATA PROJECT / PDS LUNAR DATA NODE. Al Schultz[1], David R. Williams[2], and Edward A. Guinness[3], [1]NSSDC, Code 690.1, Goddard Space Flight Center, Greenbelt, MD, 20771, schultz@mail630.gsfc.nasa.gov, [2]PSGS, NSSDC, Code 690.1, Goddard Space Flight Center, Greenbelt, MD, 20771, dave.williams@nasa.gov, [3]Department of Earth and Planetary Sciences, Washington University, St. Louis, MO, 63130, guinness@rsmail.wustl.edu

The Lunar Data Project (LDP) has been an ongoing effort at NASA's National Space Science Data Center (NSSDC) to put relevant, scientifically important Apollo data into accessible digital form for use by researchers and mission planners. The Lunar Data Node (LDN) has been formed under the auspices of the Planetary Data System (PDS) Geosciences Node [1]. We will report on progress made since last year and plans for future data restorations.

The Apollo lunar missions returned a wealth of information, including long-term (1969-1977) surface data collected by autonomous ALSEP (Apollo Lunar Surface Experiment Package) stations emplaced by the crews of the Apollo 12, 14, 15, 16, and 17 missions, surface point measurements, and orbital data. The data, meant primarily for evaluation of the engineering aspects of human sorties to the Moon and eventual establishment of lunar bases, represent the only long-term information on the lunar surface environment, and as such are ideal for studying the lunar domain and planning future lunar exploration.

Much of the ALSEP and other surface and orbital data housed at NSSDC are in forms which are not readily usable, such as microfilm, hardcopy, and magnetic tapes with older, seldom-used formats. The LDN is prioritizing these data based on their scientific and engineering value for hazard and resource assessment and the level of effort required for archiving.

Data from three experiments, X-Ray Spectrometer (XRS), Cold Cathode Ion Gage (CCIG), and Solar Wind Spectrometer (SWS), comprising eight unique data sets, have been restored and prepared for archive. A PDS data peer review was held on 7 December 2007 to evaluate the data sets for archive with the PDS. The results of the review are being applied to the data sets as liens, conditions which must be met before they are submitted to the PDS. All liens were minor and the data will be archived this spring with the PDS and made available online through the PDS Geosciences Node website.

The following data sets are being revised based on the peer review results. The Apollo 15 and 16 XRS data comprise X-ray readings over energy levels relevant to common elements expected on the lunar surface.

The Apollo 14 and 15 ALSEP CCIG data consist of plots of ion concentrations in the tenuous lunar atmosphere over time that have been digitized from the archived microfilm records.

The Apollo 12 and 15 SWS data, measurements of solar wind ions and electrons striking the lunar surface, have been read from magnetic tape and converted to Common Data Format (CDF). All these are currently online at NSSDC and will be archived with the PDS.

The Apollo 15 and 16 Soil Mechanics data, handwritten charts and plots from the Lunar Penetrometer, were also evaluated at the peer review. These have been digitized from the archival microfilm, put online at NSSDC, and are being prepared for submission to the PDS.

The Apollo 14 and 15 Dust, Thermal, and Radiation Engineering Measurements data, comprising tables of solar cell voltages over time which give information on the degradation of solar cells and the lunar dust environment, are being scanned from microfilm using optical character recognition software to produce digital tables of this data for the PDS.

The Apollo 14 Charged Particle Lunar Environment Experiment data, energy spectra of charged particles striking the lunar surface, have been read from magnetic tape and are being converted into CDF for addition to the online CDAWeb system and prepared for archive with the PDS.

Future plans include the Apollo 15 and 16 Alpha Particle Spectrometer, Apollo 17 Far-Ultraviolet Spectrometer, Apollo 14 and 15 Suprathermal Ion Detector Experiment, Apollo 15 and 16 Gamma-Ray Spectrometer, Apollo 16

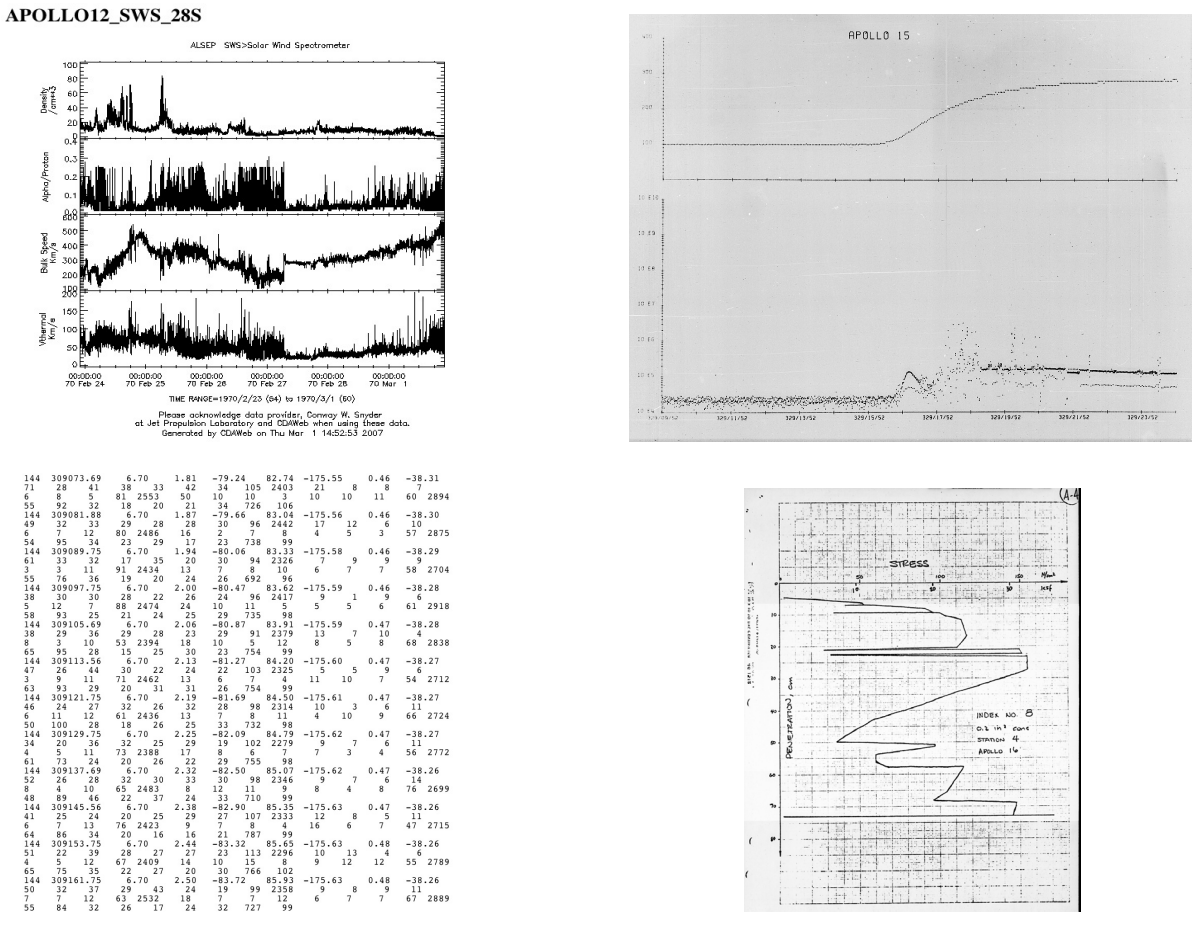
Active Seismic Experiment, and the Apollo 15 and 16 Subsatellite Lunar Particle and Boundary Layer Experiment. NSSDC is also supporting restoration the Apollo Metric and Panoramic Photography [2], and the Lunar Data Node is involved in other concurrent data restoration efforts, including the Apollo Heat Flow [3], and Apollo Surface and Orbital Magnetic Fields [4]. We are still soliciting external feedback and suggestions on useful future data sets for restoration.

Metadata, ancillary information to aid in the use and understanding of the data, have been compiled and are included in these online data collections. The documentation covers complete descriptions of the data sets, formats, processing history, and relevant references and contacts, as well as descriptions of the instruments used to collect the data and mission history. At the end of this multi-year effort we will have the relevant data and associated metadata online and easily accessible to interested users from the lunar scientific and exploration communities.

The other LDP/LDN team members are: Ray Arvidson, Pam Clark, Jay Friedlander, Jim Garvin, David Han, H. Kent Hills, Danny Hoag, Eric Holloway, Howard Leckner, Allison Lopez, Paul Lowman, Stephanie McLaughlin, Bruce Milam, Jeff Plescia, and Patrick Taylor.

The data sets and more information on the Lunar Data Project can be found online at nssdc.gsfc.nasa.gov/planetary/lunar/lunar_data/.

References: [1] Slavney et al. (2008), LPSC XXXIX. [2] Robinson et al. (2008), The Apollo digital image archive, LPSC XXXIX. [3] Nakamura et al. (2008), LPSC XXXIX. [4] Chi et al. (2008), Restoration of Apollo Magnetic Field Data, LPSC XXXIX.



Examples of restored data (clockwise from upper left): SWS (CDAWeb plots), CCIG (top temperature, lower density), Soil Mechanics Penetrometer (stress), X-Ray Spectrometer (time, position angles, and counts)