RESTORATION OF APOLLO DATA BY THE PDS LUNAR DATA NODE. David R. Williams[1], Alfred B. Schultz[1], H. Kent Hills[2], Edward A. Guinness[3], Paul D. Lowman[4], and Patrick T. Taylor[4], [1]PDS, Code 690.1, Goddard Space Flight Center, Greenbelt, MD, 20771, david.r.williams@nasa.gov, alfred.b.schultz@nasa.gov, [2]ADNET, NSSDC, Code 690.1, Goddard Space Flight Center, Greenbelt, MD 20771, howard.k.hills@nasa.gov, [3]Department of Earth and Planetary Sciences, Washington University, St. Louis, MO, 63130, guinness@wustl.edu, [4]NASA Code 698, Goddard Space Flight Center, Green Belt, MD 20771, paul.d.lowman@nasa.gov, patrick.t.taylor@nasa.gov

The Lunar Data Node (LDN) has been formed under the auspices of the Planetary Data System (PDS) Geosciences Node to put relevant, scientifically important Apollo data into accessible digital form for use by researchers and mission planners [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 National Space Science Data Center (NSSDC), GSFC are in forms that are not readily usable, such as microfilm, hardcopy, and magnetic tapes with older, obsolete 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 restoration.

Data from three experiments, Apollo 15 and 16 X-Ray Spectrometer (XRS), Apollo 14 and 15 ALSEP Cold Cathode Ion Gage (CCIG), and the Apollo 12 and 15 Solar Wind Spectrometer (SWS), comprising eight unique data sets, have been restored, prepared for archiving, and completed PDS peer review. The CCIG and SWS datasets have been delivered to the PDS Geosciences Node for archiving and distribution to the science community. The XRS dataset is awaiting the addition of SOLRAD data before this dataset is submitted for archiving. The CCIG and SWS datasets are available online through the PDS Geosciences Node website (pds-geosciences.wustl.edu/missions/apollo/). Figure 1shows examples of restored data sets.

The Apollo 15 and 16 Soil Mechanics data, handwritten charts and plots from the Lunar Penetrometer, were also evaluated at the PDS peer review. These have been digitized from the archival microfilm, put online at NSSDC, and are being prepared for submission to the PDS. Additional information about where the measurements were made is being added to this dataset.

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. The Apollo 14 data have been scanned and optical character recognition software is being used to produce digital tables of this data for the PDS. The scanning of Apollo 15 microfilm should be completed by late Spring 2009.

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 restoration of the Apollo 15 and 16 Alpha Particle Spectrometer, Apollo 17 Far-Ultraviolet Spectrometer, Apollo 12, 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 data sets. NSSDC is also supporting restoration of 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], Apollo Surface and Orbital Magnetic Fields [4], and Apollo 17 Lunar Atmospheric Composition Experiment [5]. Other datasets being examined include Apollo 17 Traverse Gravimeter, Surface Gravimeter, and Lunar Sounder. 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 LDN team members are: Ray Arvidson, Pam Clark, Jay Friedlander, Jim Garvin, Danny Hoag, Howard Leckner, Michael Liu, Allison Lopez, Stephanie McLaughlin, Bruce Milam, and Jeff Plescia.

The data sets and more information can be found at the NSSDC Lunar Data Project website nssdc.gsfc.nasa.gov/planetary/lunar/lunar_data/ and the PDS Geosciences Node website pds-geosciences.wustl.edu/.

References: [1] Slavney et al. (2008), LPSC XXXIX. [2] Robinson et al. (2008), LPSC XXXIX. [3] Nakamura et al. (2008), LPSC XXXIX. [4] Chi et al. (2008), LPSC XXXIX, [5] Hodges et al. (1973), LPSC IV, 2855.

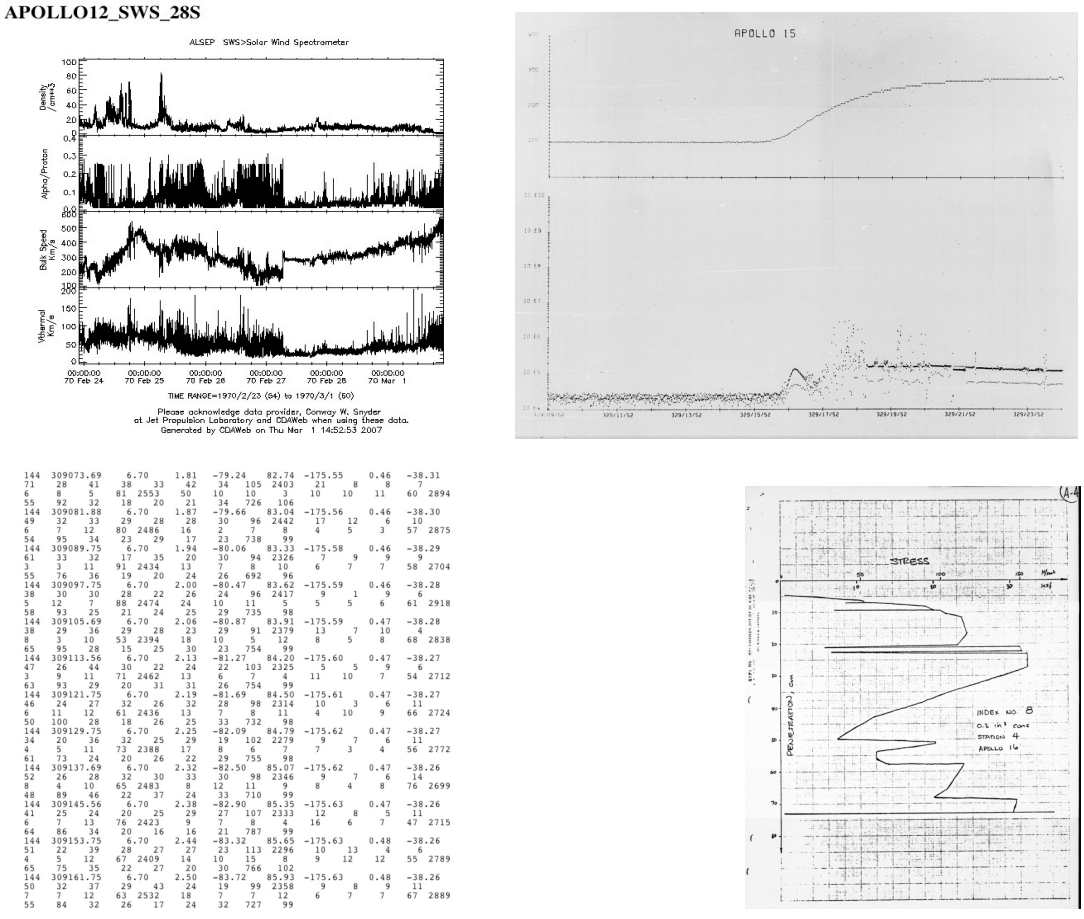

Figure 1: Examples of restored data (clockwise from upper left): SWS (CDAWeb plots), CCIG (top temperature, lower density), Soil Mechanics Penetrometer (stress), X-Ray Spectrometer (time, position angles, and counts)