

# The Lunar Data Project

The Lunar Data Project (LDP) is an effort to take relevant, scientifically important Apollo data archived at the National Space Science Data Center (NSSDC) and put it into a digital form which can be used by researchers and mission planners. The NSSDC holds the most complete collection of these data, but much are stored on hard copy media or on magnetic tapes in old, rarely used formats, making them inaccessible to most users. The LDP will digitize the data held on microfilm, microfiche, photographic film, and hard-copy documents and will convert the magnetic tape data into standard widely-used digital formats for archive and distribution to the science and engineering communities.

At the close of the 1960's and beginning of the 1970's, NASA's Apollo project landed six astronaut missions on the Moon. Five of these (Apollos 12, 14, 15, 16, and 17) set up long-lived instrument suites, the Apollo Lunar Surface Experiments Packages, or ALSEPs, on the lunar surface. These packages operated autonomously and transmitted data back to Earth until 1977. The data, meant primarily for evaluation of the engineering aspects of lunar bases and long-term human habitation, represent the only long-term information on the lunar surface environment, and as such are ideal for planning future lunar missions. The Apollo missions also acquired lunar data from hand-held instruments on the surface and from orbit. These data also hold valuable information on the lunar environment. The data were examined in the 1970's but have not been widely used since that time. Much of the data would be amenable to methods of analysis and advances in hardware that have been developed in the intervening years. If the data were more readily available and usable in today's environment, they could provide a wealth of information for scientific studies and for planning future lunar exploration.

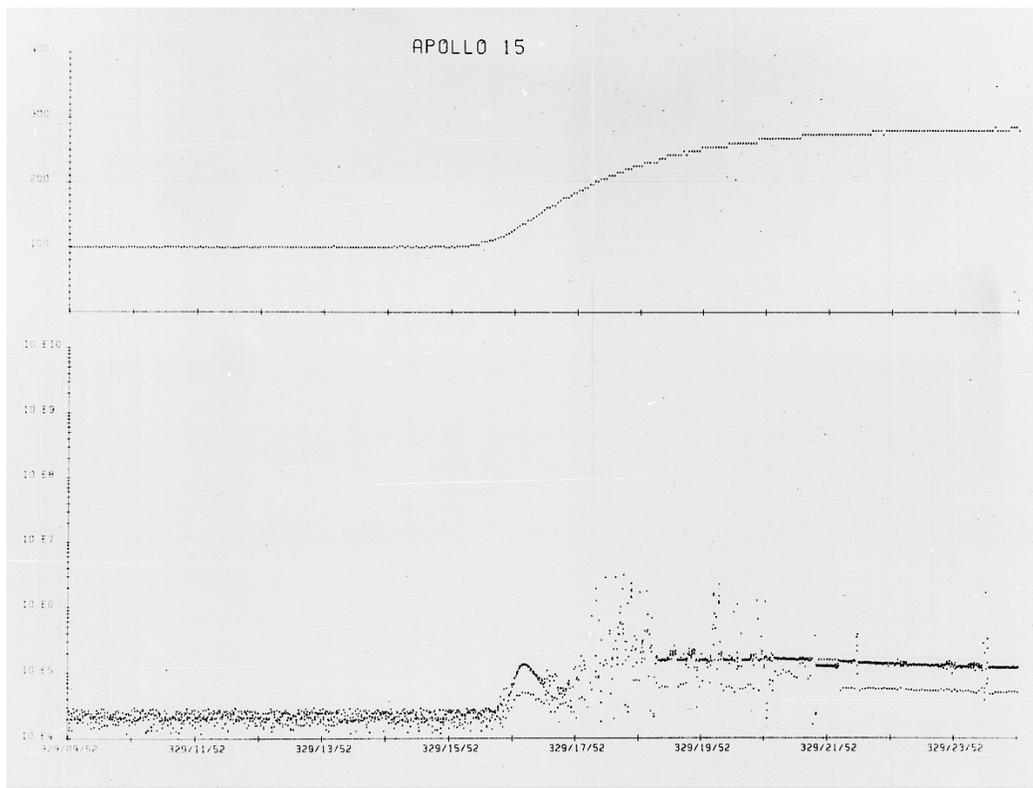
In order to prioritize the data for restoration a Lunar Data Evaluation Team, a group of scientists and engineers from Goddard Space Flight Center led by Paul Lowman, met and reviewed the Apollo data held at NSSDC. The rationale for selecting data to be restored was to avoid repeating experiments on future missions, explore environmental hazards and safe landing sites, and choose data which would be amenable to analysis using new techniques and hardware. The data were chosen based on their relevance to future lunar exploration, scientific and engineering value, and ease of restoration. The selected data are primarily from the ALSEPs: the Suprathermal Ion Detector Experiment, the Cold Cathode Ion Gage, the Charged Particle Lunar Environment Experiment, the Solar Wind Spectrometer, and the Dust, Thermal, and Radiation Engineering Measurements Package. Soil Mechanics Investigations are included. There are also data from orbital experiments: the Subsatellite Lunar Particle Shadows and Boundary Layer Experiment, the Alpha Particle Spectrometer, and the Far-Ultraviolet Spectrometer.

Depending on its original format, the data are being scanned from hard-copy media or read from magnetic media and converted into easily usable and transportable digital form, typically ASCII tables. Metadata, ancillary information to aid in the use and understanding of the data, are also being produced and incorporated into the individual data sets. This will include complete descriptions of the data, formats, processing history, instruments and missions, and contact information and relevant references, as well as any other information deemed necessary to make full use of the data. These data sets will be made available online in a Lunar Exploration Enabling Database (LEED) and archived with the Planetary Data System to assure widespread distribution to the scientific and engineering communities. In the future we are looking to add more data sets and include selected digitized Apollo orbital photography.

## Apollo Lunar Data Sets Recommended for Restoration and Possible Future Data Sets

| Lunar Data                       | Media      | Priority | Effort | Apollo Mission     |
|----------------------------------|------------|----------|--------|--------------------|
| SIDE Mass Analyzer               | Mag. Tapes | High     | Low    | 12, 14, 15         |
| SIDE Total Ion Energy            | Mag. Tapes | High     | Low    | 12, 14, 15         |
| Charged Particle Environment     | Mag. Tapes | High     | Low    | 14                 |
| Solar Wind Spectrometer          | Mag. Tapes | High     | Low    | 12, 15             |
| Cold Cathode Ion Gage            | Microfilm  | High     | Medium | 14, 15             |
| Subsatellite Lunar Part.         | Mag. Tapes | Medium   | Low    | 15, 16             |
| SIDE PI Raw Data                 | Mag. Tapes | Medium   | Medium | 12, 14, 15         |
| SIDE Hard Copy Plots             | Hard Copy  | Medium   | Medium | 12, 14, 15         |
| Soil Mechanics                   | Microfilm  | Medium   | Medium | 15, 16             |
| Dust Detector                    | Microfilm  | Medium   | High   | 12, 14, 15         |
| ALSEP Work Tapes                 | Mag. Tapes | Medium   | Medium | 12, 14, 15, 16, 17 |
| Alpha Particle Spectrometer      | Mag. Tapes | Low      | Low    | 15, 16             |
| Far UV Spectrometer              | Mag. Tapes | Low      | Low    | 17                 |
| <b>Possible Future Data Sets</b> |            |          |        |                    |
| Lunar Passive Seismic            | Mag. Tapes | Low      | High   | 12, 14, 15, 16     |
| Apollo Panoramic Camera          | Film       | Low      | High   | 15, 16, 17         |
| Lunar Atmos. Comp. Exper.        | Mag. Tapes | Low      | Medium | 17                 |
| Heat Flow Experiment             | Mag. Tapes | Low      | Medium | 15, 17             |
| X-Ray/Gamma Ray                  | Mag. Tapes | Low      | Medium | 15, 16             |

### Scan of Apollo 15 Cold Cathode Ion Gage data at sunrise, temperature and particles/cc vs. time



For more information, see: [http://nssdc.gsfc.nasa.gov/planetary/lunar/lunar\\_data/](http://nssdc.gsfc.nasa.gov/planetary/lunar/lunar_data/)

For questions or comments on the Lunar Data Project, please contact:

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