The Lunar Solar Origins Exploration (LunaSOX) project at NASA Goddard Space Flight Center now provides enhanced data access and analysis services for lunar plasma interaction data from Apollo through the ongoing Artemis lunar orbiter mission. This project operates in support of NASA’s Lunar Advanced Science and Exploration Research (LASER) program to investigate origins of plasma kinetics and composition arising in the lunar space and surface environments from interactions with solar wind plasma. We also have general interests in science and mission applications for heliophysics of and from the Moon.

Data accessible from the LunaSOX web site at http://lunasox.gsfc.nasa.gov/ include plasma and supporting parameters from the ARTEMIS P1 and P2 spacecraft now transitioning into lunar orbit operations, the Apollo 12 and 15 ALSEP lunar surface solar wind monitors, and the Explorer 35 spacecraft. The LunaSOX interface also provides access to time histories of transverse separations between the Moon and each of Geotail, IMP 8, Wind, ACE and the Earth. These data support selection of times when direct correlations between upstream solar wind and lunar environment measurements would be expected. All LunaSOX data have been reformatted from archival data sources and are fully citable.

The data are accessible as plots or lists for user-specified time spans and physical parameter subsets. ARTEMIS data from September, 2010 onward include 96s or 384s plasma density, thermal speed and flow velocity, magnetic field vectors, and spacecraft position. The Apollo lunar surface data are at 28-sec and 1-hour resolution and cover the intervals 1969-11-19 to 1976-03-25 (Apollo 12) and 1971-07-31 to 1972-06-30 (Apollo 15). Explorer 35 plasma data are at 3-min and 1-hour resolution and cover 1967-07-25 to
1968-07-03. Explorer 35 magnetic field data are also available at 81.92-sec resolution for the interval 1967-07-19 to 1972-02-23.

LunaSOX analysis tools for Artemis and Apollo data sets have been adapted from those for the OMNIWeb solar wind data service of the NASA Space Physics Data Facility. The tools include interfaces to produce occurrence frequency distributions with statistics and scatter plots with regression fits. The interfaces support filtering by the measured parameters. Interfaces for comparing time-overlapping Apollo 12 and 15 hourly averages are also included.

Additional OMNIWeb tools at http://omniweb.gsfc.nasa.gov/ enable correlation of ARTEMIS P1 and P2 plasma and magnetic field hourly averages to concurrent Wind and ACE solar wind parameters.

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