

Lunar Solar Origins Exploration (LunaSOX)

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The Moon offers a unique vantage point from which to investigate the Sun and its interaction via the solar wind magnetic fields, plasma, and energetic particles with the geospace system including the Moon itself. The lunar surface and exosphere provide in part a record of solar coronal plasma material input and resultant space weathering over billions of years. The structure and dynamics of solar wind interactions with the Moon provide an accessible near-Earth laboratory environment for study of general solar wind interactions with the vast multitude of airless asteroidal bodies of the inner solar system. Spacecraft in lunar orbit have the often simultaneous opportunity, except when in the Earth's magnetosphere, to make in-situ compositional measurements of the solar wind plasma and to carry out remote observations from the Moon of the solar corona, potentially enabled by lunar limb occultation of the solar disk. The LunaSOX project at NASA Goddard Space Flight Center is addressing these heliophysical science objectives from and of the Moon with support from NASA's Lunar Advanced Science and Exploration Research (LASER) program: (1) specify history of solar wind parameters at and sunward of the Moon through enhanced access (<http://lunasox.gsfc.nasa.gov/>) to legacy and operational mission data products from the Apollo era to the present, (2) model field and plasma interactions with the lunar surface, exosphere, and wake, as constrained by the available data, through hybrid kinetic code simulations, and (3) advance mission concepts for heliophysics from and of the Moon.

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