

OBSERVATIONS OF NEUTRAL ATOMS FROM THE SOLAR WIND

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We report observations of neutral atoms from the solar wind in the Earth's vicinity with the Low Energy Neutral Atom (LENA) imager on the IMAGE spacecraft. This instrument was designed to be capable of looking at and in the direction of the Sun. Enhancements in the hydrogen count rate in the solar direction are not correlated with either solar ultraviolet emission or suprathermal ions and are deduced to be due to neutral particles from the solar wind. LENA observes these particles from the direction closest to the location of the Sun even when the Sun is not directly in LENA's ninety degree field-of-view. Simulations show these neutrals are the result of solar wind ions charge exchanging with exospheric neutral hydrogen atoms in the post-shock flow of the solar wind in the magnetosheath. The energy of these energetic neutral particles is inferred to exceed 300 eV, consistent with solar wind energies. This is based on simulation results and on the observation of oxygen ions, sputtered from the conversion surface in the time-of-flight spectra. In addition, the sputtered oxygen abundance tracks the solar wind speed, even when IMAGE is deep inside the magnetosphere. These results show that low energy neutral atom imaging provides the capability to directly monitor the solar wind flow in the magnetosheath from inside the magnetosphere, because there is a continuous and significant flux of neutral atoms originating from the solar wind that permeates the magnetosphere.