Geophysical Research Abstracts
Vol. 12, EGU2010-13019-2, 2010
EGU General Assembly 2010

Variations of Low-energy Ion Distributions Measured in the Inner Heliosheath

R. B. Decker (1), S. M. Krimigis (1,2), and E. C. Roelof (1)

(1) Johns Hopkins Univ., Applied Physics, Laurel, Maryland, USA (robert.decker@jhuapl.edu, 001 240 228 0386), (2) Office for Space Research and Technology, Academy of Athens, Athens, Greece

Voyagers 1 (V1) and 2 (V2) are in the inner heliosheath (HSH) behind the termination shock (TS). From 2004/351 (TS crossing) to 2010/012, V1 moved in helioradius over 94-112 AU at heliographic latitude N34°, and from 2007/242 (TS crossing) to 2010/012, V2 moved over 84-91 AU at S28°. We report on variations of low-energy ion intensities, energy spectra, and angular distributions measured in the HSH, and on the differences in such variations observed at the V1 and V2 locations. During its first 1.5 years in the HSH, the V2/LECP instrument measured quasi-recurrent (15-35 day) variations in the intensities of suprathermal ions (30 keV-few MeV in 8 energy intervals). Comparable variations have not been seen in the V1/LECP ions, which show relatively smooth intensities. In addition, the low-energy ions at V1 have convective angular distributions that indicate a steady decrease in the radial component of HSH plasma flow from ≈55-65 km/s in mid-2007 to ≈10-20 km/s in late 2009. The quasi-recurrent intensity variations at V2 can be understood in terms of what occurred on the sun a year or so earlier, as revealed by examination of synoptic polar coronal hole maps from GONG. Analysis suggests relations between HSH ion intensity variations and equatorward extensions of polar coronal holes that produce stream interaction regions in the solar wind. These interaction regions and associated enhancements of low-energy ions accelerated at recurrent shocks can propagate into the outer heliosphere and into the TS/HSH. The results are promising, not only in helping explain the presence of the quasi-periodic intensity variations at V2 and the lack thereof at V1, but also in enabling us to successfully predict the diminution of intensity variations at V2 starting in early 2009. There are also variations in the angular distributions of low-energy HSH ions. Large, evidently non-convective, increases in radial anisotropies of >30 keV ions are measured at V2. During 2008.2-2008.7 these increases were sporadic. From 2009.1-onward the radial anisotropies have been steadier and show increasing amplitude. The onset of steady and increasing ion anisotropies is nearly coincident with the disappearance at V2 of 0.02-1.5 MeV electrons, the onset of the steadily decreasing radial component of plasma flow measured by V2/PLS, and the entry of V2 into southern polar coronal hole flow as indicted by V2/MAG. The origin of the non-convective suprathermal ion anisotropies is not yet clear.