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Voyager 1 in the Vicinity of the Termination Shock: an Overview of Observations beyond 94 AU in the Heliosheath

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Voyager 1 has crossed the termination shock, a major milestone in its journey to interstellar space. Since mid-2002, Voyager 1 has been moving outward with the shock, which reached its maximum distance in mid-2004 and starting moving back in as the solar wind pressure declined. On December 15, 2004, the intensity of low energy ions increased rapidly as the termination shock approached Voyager, and plasma waves excited by electrons streaming along the magnetic field indicated the shock was nearby. Voyager 1 crossed the inward moving shock on December 16 at 94 AU, observing the enhanced magnetic field as expected in the subsonic flow in the heliosheath. The lowest energy particles also abruptly increased with a low energy spectral slope of approximately -1.5, corresponding to a shock strength of ~2.5. In distinction to the upstream ions which were highly variable and strongly beamed along the magnetic field, in the heliosheath the energetic ion intensity is much less variable and more nearly isotropic, indicating a stable shock source and steady conditions for diffusive propagation. However, the low energy anomalous cosmic rays were not observed at the shock, indicating that their source region is remote from the location of Voyager 1. Continuing observations should reveal new aspects of this final frontier of the heliosphere.