Galactic Cosmic Rays in the Heliosheath: Spatial and Temporal Variations

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Abstract. We report on modeling galactic cosmic ray transport in a 2-D model heliosphere including the termination shock and and heliosheath. We consider spatial variations as well as temporal variations due to the dynamical change of the shock position and changes in the transport parameters. Numerical simulations will be compared with Voyager-1 and -2 observations. Both Voyagers find a continuous increase of galactic cosmic rays in the Heliosheath, which cannot be ascribed to a spatial gradient, but is most likely a simultaneous temporal increase at both spacecraft.

We present a simplified 2-D model assuming an ad-hoc incompressible flow pattern and resulting magnetic field in the heliosheath. Numerical simulations including particle drifts will be presented. We also address the likely history of GCRs in the heliosheath by employing a back-tracing technique. The implications of simulation results will be discussed.

Keywords: Galactic Cosmic Rays, Heliosheath, Termination Shock