

Solar cycle related variations of the cosmic ray flux computed by a hybrid hydrodynamic and transport model

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Using a five species hybrid we describe the observations of energetic cosmic ray particles by the Voyager 1 spacecraft for solar minimum and maximum conditions during both the $A < 0$ as well the $A > 0$ heliomagnetic cycle. Without going into a detailed data and model analysis, we will show that the model is well suited to explain the long term trend in the observed proton data as this spacecraft moves into the outer heliosphere. By comparison of model results to the observations along the Voyager trajectory we predict, depending on cosmic ray energy, a smooth transition in observed radial profiles after the crossing of the termination shock. From a cosmic ray particle perspective the effect of the shock might be seen in the very low energetic data (< 30 MeV) where a change in radial gradient occurs over the shock. Also, as Voyager 1 moves into the heliosheath we show that the solar cycle related changes in cosmic ray observations, which are so clearly observed inside the termination shock, decreases toward the heliopause.

