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Inner magnetospheric proton distributions during storm development: an empirical approach applied to the 21-25 April 2001 storm

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The empirical approach in global modelling the proton distributions of the inner magnetosphere [Orsini et al., 2004] is here applied for a detailed analysis of the 21-25 April 2001 storm. This method based on comparison of the Milillo et al. [2001] model with local proton spectra, results as a simple and powerful tool for inner magnetospheric studies. In this work, we use the LANL proton spectra in order to obtain the time-evolving model parameters. We compare the model parameters with the geomagnetic indexes as well as with the solar wind data. We conclude that some features of the proton spectra are recurrent during storms development, depending on Solar Wind characteristics. By applying the model parameters to the Milillo et al. [2001] empirical model with inclusion of the pitch angle distribution model by De Benedetti et al. [2005], we can derive the global evolving proton distributions. The total energy density development is analysed. In particular, this study evidenced how the particles convected or injected from the night side during storm main phase quickly decay and energize leaving a major role to the diffused particles. Finally the ENA images are simulated and compared to the observed IMAGE/HENA images.