

Estimation of electrons lifetime in the Earth's radiation belts

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Data assimilation is becoming an increasingly important tool for both understanding and prediction of space physics processes. In this study, we demonstrate how data assimilation can help to estimate unknown parameters in a radial diffusion model of acceleration of relativistic electrons during magnetic storms in the Earth's radiation belts. We apply "state augmentation" method and Extended Kalman filter to estimate the model's lifetime parameter of high-energy electrons by assimilating observations from CRRES satellite. Systematic variations in the estimates for this parameter are attributed to a complex nature of the competing effects of various acceleration and loss processes. Practical ways to calculate observational and model errors are demonstrated, which are critical for optimality of the Kalman filter.