Geophysical Research Abstracts
Vol. 19, EGU2017-8620, 2017
EGU General Assembly 2017

Data assimilation in the radiation belts using the Salammbô code

Vincent Maget and Sébastien Bourdarie
ONERA, Space Environment Dept., Toulouse, FRANCE

The natural energetic electron environment in the Earth's radiation belts is of general importance as dynamic variations in this environment can impact space hardware and contribute significantly to background signals in a range of other instruments flying in that region. The most dramatic changes in the relativistic electron populations occur during enhanced periods of geomagnetic activity. The relative importance of all competing physical processes involved in the radiation belt dynamics changes from storm to storm and the net result on particle distribution might then be very different.
Modeling Earth's radiation belts still constitutes an active field of research. The most common practice is to deduce empirical formulae of physical processes amplitudes versus one or more proxies like Kp, Dst or solar wind parameters from statistical studies. Although this allows us to reproduce the mean dynamics of the radiation belts, this may introduce errors in the system, which becomes even more important for high magnetic activity conditions for which statistics are usually poor. In parallel, it has been shown in the recent years that a data assimilation scheme based on an Ensemble Kalman Filter (EnKF) may lead to great improvements in (1) the accuracy of modeling the different regions of Earth's radiation belts, (2) the possibility to accurately predict the state of the radiation belts, and (3) in accurately reanalyzing a long time period as a basis for specification model and climatology.
This talk aims at presenting a global overview of the recent efforts undergone at ONERA concerning data assimilation in the radiation belts based on the Salammbô code and an EnKF. We will in particular focus our attention on the benefits of being able to accurately assimilate different types of measurements in our data assimilation tool.