Nowcasting the geosynchronous orbit for spacecraft anomalies analysis.

S. Bourdarie[1], D. Boscher[1], J.P Catani[2], R. Friedel[3]

[1] ONERA/DESP, 2 Av E. Belin 31055 Toulouse Cedex 04
[2] CNES, 18 Av E. Belin, 31400 Toulouse.
[3] Los Alamos National Laboratory (NIS-2), Mail Stop D436, Los Alamos, NM 87545, USA

Prime author: S. Bourdarie, Tel: 33 5 62 25 27 56; Fax: 33 5 62 25 25 69;
Email: Sebastien.Bourdarie@onecert.fr

The harsh radiation environment in the inner magnetosphere up to geosynchronous orbit is of major concern to an ever increasing amount of space hardware. While the average or quiescent conditions of the energetic particle population are fairly well characterized, the dynamics during magnetic storms are severely under-sampled. When anomalies are detected on spacecraft without any particle monitor, it is sometimes difficult to debate on the real origin of failure. This nowcasting of radiation belt is one of the goal of space weather.
We intend here to use physical Earth radiation belts properties to extend and combine existing energetic particle measurements to interpolate and extrapolate in L. Combining both measurements and model enables us to increase both the spatial and temporal resolution of the data, and allows us to define time-dependent spectrogram at any longitude for the GEO orbit.
Data is provided by DoE/DoD geosynchronous satellites. These satellites carry energetic particle instrumentation which provide almost three to four different longitude coverage of the GEO orbit. These spacecraft, all currently operational, provide nearly continuous data over periods of almost a decade.
We will discuss the relative importance of the magnetic field and the use of model in interpolating between the data. Some attempts to perform the interpolation have been made for different sets of satellites during storm periods already intensively studied.