Geophysical Research Abstracts
Vol. 21, EGU2019-17883, 2019
EGU General Assembly 2019
© Author(s) 2019. CC Attribution 4.0 license.

3D mapping of the Earth's trapped radiation particles using μASC: from the inner zone to the magnetosphere

Matija Herceg, John L. Jørgensen, Peter S. Jørgensen, and Troelz Denver

As a pioneer of the fully autonomous star trackers, the micro Advanced Stellar Compass (designed and produced at the Technical University of Denmark) has been operating successfully and robustly on numerous satellite missions ranging from Low Earth Orbiters (e.g. ESA's Swarm) to Deep Space missions (e.g. NASA's Juno), accurately providing absolute attitude reference. Besides its primary function of attitude determination, the μASC is also capable of detecting and monitoring the population of the Earth's high energy particles.
The particles with energies high enough (>20MeV) to pass the heavy shielded optical head, will normally leave a temporary trace on the CCD sensor. The signature of these high energy particles is eliminated in flight by the instrument software ensuring full performance even during the most intense CMEs, moreover, the measured rate of these penetrating particles, effectively monitors the high energy particle flux.
The micro Advanced Stellar Compass has been operating on many satellite missions orbiting the Earth. This gives the possibility to track the particle populations in both lower Earth orbit, and further away up to the Earth's magnetosphere. We present compilation of detected particle flux, its global maps and radial variation from 400 to 10000 km altitude. We further present a view of the dynamic part of the flux, from injection sources such as CMEs, which gives a detailed profiling of the direction, injection time scales and relaxation times.