EPSC Abstracts
Vol. 14, EPSC2020-851, 2020
https://doi.org/10.5194/epsc2020-851
Europlanet Science Congress 2020

Particle Motions in Planetary Magnetic Fields: Europlanet Service

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The trapping of charged particles in planetary magnetic fields is a process which underpins many important aspects of planetary magnetospheres, such as ring current evolution, particle acceleration, and the flow of current through the system, both free and bound. As part of our effort for the Europlanet project, the UCL group have developed codes which accurately model the trajectories of charged particles in magnetic field models appropriate for the magnetospheres of Jupiter and Saturn. These will form the basis of a service for the SPIDER task. In this presentation, we show examples of ion trajectories at both planets for representative 'start values' of equatorial distance, pitch angle, and values of particle energy. The simulations provide an indication of how particle orbits become less adiabatic as one approaches energies where gyroradii become comparable to magnetic field curvature radius. The disk-like fields of the gas giants are particularly effective at 'scattering' adequately high-energy particle trajectories as they cross the equator, where the field lines are most 'pinched' and have the smallest length scales.