EPSC Abstracts
Vol. 6, EPSC-DPS2011-1714, 2011
EPSC-DPS Joint Meeting 2011

Modelling the Influence of Ganymede for evaluating radiation dose received by a Ganymede orbiter

R. Allioux (1) R. Modolo (2) , P. Louarn (1),N. André (1)
(1) IRAP-CNRS/UPS, France

Abstract

With the EJSM mission concept, both ESA and NASA have expressed the need for an orbiter of Galilean moons in order to achieve breakthrough in astrobiology and planetology. 2011 nasa decadal survey has results in the possibility of redefining JGO Ganymede orbiter into a wider mission with potential Europa Fly-by. As Ganymede and more over Europa, are embedded in a very harsh Jovian environment, radiation dose studies are becoming key issues for the mission and its achievement.

Actual studies are based on several model of the Jovian electron radiation belt but none of them is able to take in consideration the effect of Ganymede and it magnetic field on the radiation budget. This study uses a model we developed at IRAP to evaluate the effect of Ganymede and its magnetic field on the energetic electron flux received at different orbits for a potential Ganymede orbiter. We have found that 3 physical processes tend to reduce electron flux during a Ganymede orbit. 1) Magnetic shielding above equatorial region 2) loss cone above polar cap and 3) emptying of flux tube due to electrons bouncing inside Jovian radiation belt flux tubes. The overall mean effect of these processes will result on a diminution of total radiation dose of at least 50% for low altitude circular polar orbit with variation with energy, orbital parameters and magnetic field configuration.

Acknowledgements

We would like to thank CNES, ESA and EADS atrium for collaboration and financial support in R. Allioux PhD funding.