

ORBITALS: A Canadian Mission to the Inner Magnetosphere

Ian R. Mann[1]

[1] Department of Physics, University of Alberta

(On behalf of the ORBITALS Science Team.)

The Outer Radiation Belt Injection, Transport, Acceleration and Loss Satellite (ORBITALS) mission is proposed as a Canadian Space Agency satellite mission contribution to ILWS. The ORBITALS is currently approved by the CSA for Phase A, and the US Mission of Opportunity 4-instrument payload MORE for the ORBITALS satellite is undergoing NASA funded Phase A study. The ORBITALS will provide a unique view of the largely previously unexplored inner magnetosphere. Its mission goal to “understand the acceleration, global distribution, and variability of energetic electrons and ions in the inner magnetosphere” is perfectly aligned with the top geospace priority for the LWS and ILWS programs. In a 12 hour low inclination orbit, the ORBITALS will come into once daily apogee conjunctions with the extensive ground-based Canadian Geospace Monitoring (CGSM) instrumentation as well as with GOES East and West. Baseline raised perigee will provide both long outer radiation belt dwell times as well as coverage of the outer-most inner radiation belt. In combination, the ORBITALS-CGSM-GOES conjunctions will provide a unique data set with which to address fundamental radiation belt science questions, such as the competition between ULF and VLF acceleration processes, the role of EMIC and VLF waves in loss, and the relationship between these processes and plasmaspheric cold plasma dynamics. The ORBITALS will also address inter-related science questions about the structure of inner magnetosphere electric and magnetic field structure, plasmaspheric dynamics, including thermal ion injection and loss, and the dynamics of the ring current population in the inner magnetosphere during storms. In combination with the approved NASA LWS RBSP mission, and the proposed Japanese ERG satellite, the ORBITALS-RBSP-ERG three petal constellation will resolve the spatio-temporal ambiguities and global dynamics and morphology of the Earth's radiation belts. Further bilateral CSA-JASA co-operation is also possible and desirable between ORBITALS and ERG.