

Physics-based computational capabilities for investigating the radio and energetic neutral atom emissions originated from the radiation belts of the Gas and Ice Giants

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We review our current computational capabilities to investigate the sources of Radio and ENA Emissions (RENAE) from Jupiter, Saturn, Uranus and Neptune. Our numerical technique to develop Models of Outer Planets Radiation Belts (MOPRB) is first presented. The distributions of energetic electrons and protons are computed with a diffusion theory particle transport code that solves the governing 3-D Fokker-Planck equation. MOPRB are constrained with in-situ data from planetary missions. The physical processes responsible for the energy and spatial distributions are highlighted using a data-model comparison approach. We next describe how our RENA E simulations are built and coupled with MOPRB. Simulations of RENA E for different planets are finally presented.

Keywords: Outer Planets, Radiation Belts, Radio Emission, ENA Emission, In-situ Data, Model Capabilities