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Giant Planets Radiation Belts: What's Next ?

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Abstract

We propose to review our current understanding of Jupiter's radiation belts by discussing the main findings obtained from the combination of data analysis and modeling results. We will discuss the physical processes that explain the major features of its radiation belts. We will compare the dynamics of the giant planet's radiation zones to those of Earth and Saturn based on our knowledge of their respective magnetospheric system, as well as theoretical considerations. For future work, we will examine the evidences for the response of the giant planets radiation belts to solar and magnetospheric activity and the origins of their variability. Lastly, we will discuss some key processes likely missing in the modeling approach to increase our understanding of the radiation zones dynamics as recently revealed by the analysis of in-situ and ground based observations.