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NASA's Radiation Belt Storm Probes (RBSP) Mission

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Abstract

Understanding of radiation belt physics has matured to the extent that we can visualize a unified set of universal processes that operate coherently across the radiation belts of the solar system, encompassing a broad spectrum of varying parametric states. An important link in developing fully predictive understanding of such processes is the Radiation Belt Storm Probes mission to be launched into Earth's radiation belts in 2012 as a part of NASA's Living with a Star program. RBSP comprises two spacecraft making in situ measurements for at least 2 years in nearly the same highly elliptical, low inclination orbits (1.1 x 5.8 R_E, 10 degrees). The orbits are slightly different so that 1 spacecraft laps the other spacecraft about every 2.5 months, allowing separation of spatial from temporal affects over spatial scales ranging from ~0.1 to 5 R_E. The unusually comprehensive suite of instruments, identical on the two spacecraft, measures all of the particle (electrons, ions, ion compositions), fields (**E** and **B**), and wave distributions (**dE** and **dB**) that are needed to resolve the most critical science questions. Here we describe the RBSP mission characteristics, review the most pressing science issues that need to be resolved to develop predictive understanding, and describe how RBSP will be used to resolve those issues.