Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization

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We present the concept, objectives and expected impact of the MAARBLE (Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization) project, which is being implemented by a consortium of seven institutions (five European, one Canadian and one US) with support from the European Community's Seventh Framework Programme.

The MAARBLE project employs multi-spacecraft monitoring of the geospace environment, complemented by ground-based monitoring, in order to analyze and assess the physical mechanisms leading to radiation belt particle energization and loss. Particular attention is paid to the role of ULF/VLF waves. A database containing properties of the waves is being created and will be made available to the scientific community. Based on the wave database, a statistical model of the wave activity dependent on the level of geomagnetic activity, solar wind forcing, and magnetospheric region will be developed.

Multi-spacecraft particle measurements will be incorporated into data assimilation tools, leading to new understanding of the causal relationships between ULF/VLF waves and radiation belt dynamics. Data assimilation techniques have been proven as a valuable tool in the field of radiation belts, able to guide 'the best' estimate of the state of a complex system.

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