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Space Weather in the Outer Solar System

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Abstract

Planetary space weather refers to the physical and phenomenological state of natural space environments around planetary bodies. Any variability related to the energy release from the Sun, in form of photon flux, solar wind streams, coronal mass ejections, and energetic particles, characterizes the space weather conditions around the Earth [1]. Within a giant planetary system, e.g. the Jovian or the Saturnian systems, space weather phenomena can be both of solar and internal (e.g. volcanism, plumes, fast planetary rotation) origin. The details of such interactions are planet-dependent and in some cases (e.g. Jupiter), internal processes dominate over external drivers. The study of planetary space weather considers different cross-disciplinary topics, such as the interaction of solar wind and of magnetospheric plasmas with planetary and satellite surfaces [2], atmospheres, and ionospheres (e.g. [3]) and the variability of magnetospheres under variable external conditions. Studying the interactions of planetary bodies with plasma, energetic particles and photon radiation helps us to acquire a better understanding of the circum-terrestrial space weather phenomena, pushing our theories and models to their extreme limits.

In this paper, a brief review of the scientific aspects of solar and non-solar driven space weather will be presented with special emphasis in the Outer Solar System case. The physics of the interactions between the environment of the body and the impinging photon and particle radiation will be discussed: detailed analysis considering space weather phenomena around icy satellites of giant planetary systems will be provided and the importance of understanding such conditions in view of future space missions will be outlined [1][4].

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