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A statistical study of the energetic electron microsignatures from Tethys and Dione

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Abstract

A new, continuously updated catalogue of energetic electron microsignature events has been created. Microsignatures are electron absorptions that appear as localized dropouts in the particle fluxes. We mapped microsignatures from Tethys and Dione, using the data of 41 Pulse Height Analysis (PHA) energy channels (20-300 keV) of the MIMI-LEMMS detector. This works focuses on the study of the microsignature displacements, namely the offsets in the microsignature locations with respect to the L-shell of the moon that caused them. According to the energy dispersion of these displacements, the microsignatures have been catalogued in five categories. In this talk we will mainly review the properties of microsignatures from two out of these five categories, which contain almost 90% of the microsignature events. The first (what we call “category 1”) is for events that exhibit monotonic energy dispersion with organized structure and the second (what we call “category 3”) is for events exhibiting complex structure in the energy dispersion. Moreover, we detected a number of microsignature event couples having similar ages and moon of origin (category 4), that raise many interesting questions about the conditions of their formation. A statistical study of the microsignature events has been currently realized, confirming the local time asymmetries of the microsignature offsets, also reported in previous studies. A tendency of the events from Tethys with complex energy dispersion to have drifted across more in the post-midnight sector in comparison to those with organized energy dispersion is also revealed. Finally, the possible connection of the complex-energy-dispersion microsignatures with the injection events is discussed.