
Suprathermal Ion and Solar Wind Charge States: a Comparison

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Abstract

Because the ionic charge states of heavy ions in the solar wind and of suprathermal particles do not change during their transport in interplanetary space, ionic charge measurements provide an invaluable tool for probing the particles source and mass/charge dependent acceleration and propagation processes. In this paper, we investigate the ionic charge composition of suprathermal heavy ions (C, O, Mg, Fe) in the energy range of 20 to 500 keV/nuc in CME / Interplanetary Shock related particle events using data from SEPICA / ACE and CELIAS / SOHO. We select events showing signatures of local acceleration in interplanetary space and compare the ionic charge composition of suprathermal particles with solar wind charge states measured during the same time period. We find a large variability of the mean ionic charge of suprathermal ions, in particular for iron. For some events, the solar wind iron charge distribution is consistent with the suprathermal distribution, in other events the mean ionic charge of iron of the suprathermal distribution is up to 1.5 charge states larger. The results will be discussed in terms of the source of the suprathermal particles and of possible rigidity (mass/charge) dependent injection and acceleration effects.