

# Statistical characteristics of energetic storm particle events

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When a transient interplanetary (IP) shock arrives at a location far from the Sun, an increase in energetic particle fluxes may be observed in the immediate vicinity of the shock due to particles trapped in the turbulent shock region. These particles are called energetic storm particles (ESPs). We have initiated an extensive statistical study of high-energy ESP events using protons of 1-100 MeV observed by the ERNE particle telescope on-board the SOHO spacecraft. A central tool in the study is a comprehensive database of IP shock candidates gathered from several compiled shock lists available in the internet and literature. Currently, our database includes a total of 606 entries, from a seven-year period between May 1996 and April 2003, representing various structures seen in the solar wind data. Fast forward shocks constitute a major fraction (53 %) of the entries. Previously, we have searched for the associated ESP signatures only for the most reliably identified fast forward shocks, and mainly focused on the fact whether there are any ESPs or not. Considering only these reliable cases, we concluded that 48 % (74/153) of the fast forward IP shocks produced ESPs (protons) at energies greater than 1.5 MeV. Our next step is to analyze the ESP events in more detail. We will determine, e.g., 1) onset times and times of maximum intensities at different energies compared to the time of the IP shock passage, 2) e-folding rise times of the intensities, 3) energy spectra at the time of maximum and integrated over the event, 4) maximum accelerated energy, and 5) helium-to-proton ratios. These characteristics are then examined against various shock properties. Possible correlations between ESP and shock properties are discussed.