

Multi-spacecraft Observations of Interplanetary Shock Accelerated Particle Events

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We use simultaneous measurements from the Wind and ACE spacecraft to determine the spatial properties of both interplanetary (IP) shocks and the shock-associated energetic particle events. We combine plasma, magnetic field and energetic particle data from ACE and Wind during five energetic storm particle (ESP) events and examine the spatial and temporal variations of these events in the Earth's vicinity. We find that even though the two spacecraft were separated by more than 300 RE, the plasma, field, and particle data profiles during the events were very similar. We also used the fitted shock velocity along the normal from ACE and estimated the shock transit time to Wind location. In general, there is poor agreement between the estimated transit time and the actual measured transit time. Hence, our assumptions that a) the IP shock at 1 AU propagates radially, and/or b) the IP shock is spherically symmetric at 1 AU are not valid.