SOLAR ENERGETIC PARTICLE TIME-TO-MAXIMUM STUDIES WITH WIND AND ACE

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Time-intensity profiles in solar energetic particle (SEP) events carry information on both interplanetary particle transport and the moving, evolving coronal-mass-ejection-driven shock that is believed to be the primary accelerator in gradual events. We examine the energy- and species-dependence of the so-called time-to-maximum (TTM), the elapsed time between the start of the event and the occurrence of the maximum particle intensity, using the extended energy ranges, finer energy bins, and high statistics offered by the Low-Energy Matrix Telescope (LEMT) on Wind and the Solar Isotope Spectrometer (SIS) on ACE. Together, LEMT and SIS provide data on ions from He through Fe at ~2 to ~100 MeV/nuc. We also use proton and alpha measurements from IMP8 and GOES. We survey the TTM values in ~20 of the largest SEP events observed so far in Cycle 23. In some cases, the TTM is associated with the arrival of a powerful shock at 1 AU and is therefore the same for nearly all species and energies. In other events, the time-intensity profiles are significantly distorted by local variations in the interplanetary plasma beta [Reames, Ng, & Berdichevsky *Ap.J.*, in press], thereby precluding a clear determination of the TTM. Roughly one-quarter of the events show clear systematic variation in the TTMs. In some cases, these TTM variations suggest higher-than-usual Fe charge states and/or energy-dependent Fe charge states. However, we find that our high-statistics studies do not generally support a simple functional form of TTM (a power-law in rigidity) which could be used to infer ionic charge states, as suggested by Dietrich & Lopate (*Proc. 26th ICRC*, **6**, 91-94, 1999) based on low-statistics ion measurements from IMP8 only. Finally, we compare TTM systematics with proton spectra and intensity. We speculate that TTM variations may reflect the role of proton-generated Alfvén waves in SEP transport in large events.