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October/November 2003 ICMEs: ACE/EPAM Solar Energetic Particle observations

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In late October and early November 2003, the ACE spacecraft at 1 AU detected two shock-associated Interplanetary Coronal Mass Ejections (ICMEs). In the sheath region formed in front of both ICMEs some of the highest speeds ever directly measured in the solar wind were observed. We analyze in detail the energetic particle signatures measured at 1 AU by the EPAM experiment onboard ACE during the passage and in the vicinity of these ICMEs. Solar Energetic Particles (SEPs) are utilized as diagnostic tracers of the large-scale structure and topology of the Interplanetary Magnetic Field (IMF) embedded within both ICME events. Two scenarios in terms of open and closed magnetic field configurations consistent with the observations are discussed. In the context of an open field configuration, the energetic particle observations provide evidence for strong trapping of SEPs in the region between the two traveling CME-driven shocks. Furthermore, we use the ACE/EPAM observations to reassess the leading and trailing boundaries of the ICMEs with respect to those previously proposed based upon ACE/SWEPAM solar wind plasma and suprathermal electron measurements and ACE/MAG magnetic field data.