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Forecasting Solar Energetic Particle Events with the SPARX Forecasting System.

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Solar Energetic Particles (SEPs) are accelerated by solar flares and shock waves driven by coronal mass ejections. SEP events are an important space weather hazard due to the significant radiation doses these particles can impart on humans and human technology in space. Indeed the highest energy SEPs can penetrate through Earth's magnetosphere and atmosphere and increase radiation doses at aviation altitudes. We simulate the transport of SEPs from their release out through the heliospheric magnetic field. To do this, we have developed the SPARX SEP forecasting system which models the SEP event evolution by means of a 3-D test particle approach. In this study, we compare previous results of the SEP test-particle model, produced using an ideal Parker Spiral magnetic field, with our new simulations using magnetic and electric fields deduced from the 3-D ENLIL solar wind model. Using ENLIL model output as input for our SEP forecasts we can study how the energetic particles react to more realistic and spatially inhomogeneous magnetic and electric fields. Our results therefore show the effects of energetic particle drifts in the presence of natural curvatures and gradients contained within realistic heliospheric structures from ENLIL, and how they can modify the event evolution from that in a simple Parker spiral geometry. We will discuss how these heliospheric fields could be included within real-time forecasting of SEP events.