On the real-time prediction Of Solar Energetic Particle events

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The UMASEP program predicts the occurrence of SEP events with E > 10 MeV and E > 100 MeV, and the intensity of their first hours. This automatic forecaster analyzes flare and near-Earth space environment data (soft X-ray, differential and integral proton fluxes). For well-connected events, the system empirically estimates the magnetic connectivity from the associated CME/flare process zone to the near-Earth environment by correlating the soft X-ray flux and the initial increase in the differential proton fluxes. The system is also able to identify in real-time the flare associated to the expected well-connected SEP event. For poorly-connected events, the system checks whether the differential proton flux behavior is similar to that in the beginning phases of previous historically poorly-connected events and thus deduce similar consequences. For the events since 1994 (until October 2013) of the NOAA/SWPC SEP list (E > 10 MeV), the presented system has a probability of detection (POD) of all well- and poorly-connected events of 86.29% (107/124), a false alarm ratio (FAR) of 24.11% (34/141), which outperforms current automatic forecasters. By using the same empirical approaches, the system was recently extended to predict events with E > 100 MeV.

My visit to GSFC had two goals:
1) Adaptation of UMASEP application to predict well-connected SEP events for STEREO mission using EUVI observations. The preliminary results will be presented with successful predictions.
2) With the purpose of improving the forecasting performance of this model, a new approach for predicting the feasible ranges of time intervals within which shocks are expected to cross the IMF line connected to the Earth was designed and its preliminary results will also be presented.