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Solar energetic particle events and parent solar activity

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Solar energetic particles (SEPs) provide a unique tool to study particle acceleration and propagation in the solar and IP environment. The SEP profiles detected at 1 AU are due to the combined effects of acceleration, injection and transport of these particles. This work is focused towards improving the observational identification of the particle acceleration processes in the solar corona. We re-visit statistical associations between the SEP intensity measured in space and parameters of the parent solar activity, including soft X-rays (peak flux), microwaves (peak flux and fluence), radio spectral parameters and CME speed and width.

The work covers all SEPs (electrons and protons to energies of hundreds of MeVs), during the last solar cycle that were associated with flares of X and M class located at western heliolongitudes. In order to assess the IP plasma and field conditions preexisting during the particle propagation, we distinguish two configurations, namely, typical solar wind plasma (and Parker spiral-like magnetic field configuration) and transient magnetic field structures of interplanetary coronal mass ejections (ICMEs). We find that the relationships between the SEP intensity and the parent coronal activity depend on the interplanetary magnetic field configuration, and discuss possible interpretations.