



## **Statistical analysis of solar energetic particle events and related solar activity**

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The FP7 COMESEP (COronal Mass Ejections and Solar Energetic Particles: forecasting the space weather impact) project is developing tools for forecasting geomagnetic storms and solar energetic particle (SEP) radiation storms. Here we present preliminary results on a statistical analysis of SEP events and their parent solar activity during Solar Cycle 23. The work aims to identify correlations between solar events and SEP events relevant for space weather, as well as to quantify SEP event probabilities for use within the COMESEP alert system. The data sample covers the SOHO era and is based on the SEPTEM reference event list [<http://dev.sepem.oma.be/>]. Events are subdivided if separate enhancements are observed in higher energy channels as defined for the list of Cane et al (2010). Energetic Storm Particle (ESP) enhancements during these events are identified by associating ESP-like increases in the proton channels with shocks detected in ACE and WIND data. Their contribution has been estimated and subtracted from the proton fluxes. Relationships are investigated between solar flare parameters such as X-ray intensity and heliographic location on the one hand, and the probability of occurrence and strength of energetic proton flux increases on the other hand. The same exercise is performed using the velocity and width of coronal mass ejections to examine their SEP productiveness. Relationships between solar event characteristics and SEP event spectral indices and fluences are also studied, as well as enhancements in heavy ion fluxes measured by the SIS instrument on board the ACE spacecraft during the same event periods.

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