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On the prediction of GLE events

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A model for predicting the occurrence of GLE events is presented. This model uses the UMASEP scheme based on the lag-correlation between the time derivatives of soft X-ray flux (SXR) and near-earth proton fluxes (Núñez, 2011, 2015). We extended this approach with the correlation between SXR and ground-level neutron measurements. This model was calibrated with X-ray, proton and neutron data obtained during the period 1989[U+2500]2015 from the GOES/HEPAD instrument, and neutron data from the Neutron Monitor Data Base (NMDB). During this period, 32 GLE events were detected by neutron monitor stations. We consider that a GLE prediction is successful when it is triggered before the first GLE alert is issued by any neutron station of the NMDB network. For the most recent 16 years (2015[U+2500]2000), the model was able to issue successful predictions for the 53.8% (7 of 13 GLE events), obtaining a false alarm ratio (FAR) of 36.4% (4/11), and an average warning time of 10 min. For the first years of the evaluation period (1989[U+2500]1999), the model was able to issue successful predictions for the 31.6% (6 of 19 GLE events), obtaining a FAR of 33.3% (3/9), and an AWT of 17 min. A preliminary conclusion is that the model is not able to predict the promptest events but the more gradual ones. The final goal of this project, which is now halfway through its planned two-year duration, is the prediction of >500 MeV events. This project has received funding from the European Union's Horizon 2020 research and innovation programme under agreement No 637324.