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Near real-time reconstruction of the solar spectral irradiance in the UV-EUV

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The solar radiative output in the UV and Extreme-UV (EUV) is a crucial quantity for space weather applications that require a specification of the thermosphere/ionosphere system, but also for the forcing of climate. The continuous monitoring of the UV/EUV spectrum is a major instrumental challenge, so that alternatives must be found to ensure the continuity of the observations. This is a timely issue as the SORCE satellite is not expected to last for much longer.

Numerous studies have shown that the salient features of the solar spectral variability can be reconstructed from the evolution of the photospheric magnetic field. We have developed an artificial neural network model to compute the UV/EUV spectrum in near-real time, using magnetograms from SDO/HMI. The magnetic structures are identified and classified according to the area of the solar disk covered. We constrain the model by comparing its output with observations made by instruments onboard of SORCE satellite.

The model allows us to nowcast and forecast the total and spectral solar irradiance up to one week days in advance. In addition, it gives deeper insight into the contributions to the spectral variability. The model output is available at http://www.lpc2e.cnrs-orleans.fr/∼soteria.