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Modeling the evolution of the total and solar irradiance based on HMI/SDO magnetograms and solar surface magnetic flux transport models

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The variability of the total and spectral solar irradiance affects directly the composition and thermal structure of the Earth's atmosphere. While the total solar irradiance is the main external source of heat to the Earth's couple atmospheric/oceanic system, the emission in different regions of the spectrum affects the composition and the thermal structure of different layers of the Earth's atmosphere. Consequently, reconstructions of the solar irradiance are needed to distinguish between natural and anthropogenic forcings of climate change. Additionally, the evolution of the solar irradiance is required for space weather applications. Here we present a model of the solar irradiance for space weather applicatons based on high resolution/high cadence solar magnetograms measured by HMI instrument onboard of SDO spacecraft and solar surface magnetic flux transport models. The preliminary results, uncertainties and operational issues are discussed in details. This work is supported by the European Commission's Seventh Framework Programme (FP7/2007-2013) under the grant agreement n° 218816 (SOTERIA project) and 261948 (ATMOP Project). A prototype of the forecast model is available at: http://lpc2e.cnrs-orleans.fr/∼soteria/ .