Modeling Electron Density, Temperature Distribution in the Solar Corona Based on Solar Surface Magnetic Field Observations

Jenny Marcela Rodríguez Gómez, **Luis Eduardo Antunes Vieira** _[luis.vieira71@googlemail.com],_
Alisson dal Lago, Tardelli Ronan Coelho Stekel, Joaquim E. R. Costa, and Tereza S. N. Pinto;
National Institute for Space Research (INPE), São José dos Campos - SP, Brazil

Magnetic fields constitute a natural link between the Sun, the Earth and the Heliosphere in general. The structure of the solar corona is mostly determined by the configuration and evolution of the magnetic field. While open magnetic field lines carry plasma into the heliosphere, closed field lines confine plasma. Additionally, key physical processes that impact the evolution of Earth's atmosphere on time-scale from days to millennia, such as the soft X-ray and EUV emission, are also determined by the solar magnetic field. However, observations of the solar spectral irradiance are restricted to the last few solar cycles and are subject to large uncertainties. Here we present a physics-based model to reconstruct in near-real time the evolution of the solar EUV emission based on the configuration of the magnetic field imprinted on the solar surface and assuming that the emission lines are optically thin. The structure of the coronal magnetic field is estimated employing a potential field source surface extrapolation based on synoptic charts. A hydrostatic model describes the coronal plasma temperature and density. The emission is estimated to employ the CHIANTI database. The performance of the model is compared to the emission observed by EVE instrument on board SDO spacecraft for two different wavelengths. The preliminary results and uncertainties are discussed in details. Furthermore, we examine the possibility of delivering the reconstruction of the solar spectral irradiance in near-real time using the infrastructure the infrastructure provided by the Brazilian Space weather program (EMBRACE/INPE). This work is partially supported by CNPq/Brazil under the grant agreement no. 140779/2015-9.