



Large-scale forcing on lightning in Portugal

J. A. Santos (1), J. Sousa (2), M.A. Reis (1), S.M. Leite (1), S. Correia (3), H. Fraga (1), and M. Fragoso (3)

(1) UTAD, CITAB, Physics, Vila Real, Portugal (jsantos@utad.pt), (2) Instituto de Meteorologia, Portugal, (3) Centre for Geographical Studies, Institute of Geography and Spatial Planning, University of Lisbon, Lisboa, Portugal

An overview of the large-scale atmospheric forcing on the occurrence of cloud-to-ground lightning activity over Portugal is presented here. A dataset generated by a network of nine sensors, maintained by the Portuguese Meteorological Institute (four sensors) and by Spanish Meteorological Agency (five sensors), with available data over the 2003-2009 time period (7 years) is used for this purpose. For the same time period, a state-of-the-art high-resolution reanalysis dataset in a 1.0° latitude \times 1.0° longitude grid (Modern Era Retrospective – Analysis for Research and Applications; MERRA300) is also considered in order to assess the atmospheric large-scale features over the target region. Three lightning regimes of the atmospheric general circulation within the Euro-Atlantic sector can be clearly detected. These regimes are characterized according to their underlying dynamical conditions (sea surface pressure, 500 hPa geopotential height and air temperature, streamlines of the 10 m wind vectors, and best 4-layer lifted index at 500 hPa). The spatial distribution of lightning activity in Portugal (patterns of the density of the atmospheric electrical discharges) is also analyzed for each regime separately. Considerations regarding seasonality, flash polarity and daily cycles in the lightning activity are also given for each lightning regime.