

Estimation of the variability of dust aerosol optical depth over several European regions based on the forecast model data

Florian Mandija (1,2), Victor Chávez Pérez (2), Luis Gimeno Presa (2), Raquel Nieto (2), and Juan Antonio Añel Cabanelas (2)

(1) University of Shkodra, Physics, Shkoder, Albania, (2) University of Vigo, Faculty of Natural Science, Ourense, Spain

The main goal of this work is to determine the patterns of the variability of dust aerosol optical depth (AOD) over the European continent for a 9-years period. This aerosol parameter is an important indicator of the presence of dust plumes over the investigated area. Saharan and Arabic deserts are the two major dust sources which affect the European continent.

The model used in this study is BSC-DREAM8b_v2.0 (Atmospheric Dust Forecast System), which provided AOD₅₅₀ data from January 2006 up to December 2014. The investigation of the dust event climatology was realized dividing the affected area (European continent) and dust source area (two main deserts) into several distinct sectors. The European continent is divided into 8 sectors and the two deserts are divided into 4 sectors. The threshold of sector-averaged AOD₅₅₀ in the cases of dust events is chosen 0.10.

Overall results indicate that the dust events affect more the three southern sectors, especially the central one. Meanwhile, the two northern sectors are less affected. It was observed also a dependence of AOD also on the longitude. Central sectors have higher average AOD, while the west ones have the lowest. Highest AOD are observed during late spring and early summer at central and eastern sectors, and during summer at western sector. More than 67% of all daily-averaged AOD data, which overpass the threshold, at all sectors, are lower than 0.2. Sector-averaged AOD at three southern sectors was 0.02-0.04, while at the northern sectors this value falls down to 0.002-0.001. Moreover, no clear inter-annual trends are identified. The yearly cycles of AOD over the European sectors were more evident at southern sectors, especially at the regions of Apennine and Balkan peninsulas.