



Weekly cycle patterns of total cloud cover over Europe and their connection to aerosol weekly variability and synoptic transport

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In this work, we have focused on the spatial and temporal variability of the total cloud fraction and aerosol weekly cycle over Europe (30°N-70°N, 15°W-60°E) as these were recorded from TERRA MODIS and AQUA MODIS satellite instruments. Cloud and aerosol optical properties retrieved from TERRA (2/2000-2/2009) and AQUA (7/2002-12/2008) MODIS were used in order to produce an index capable of detecting the weekly cycle of these parameters from space. First, the general aerosol optical depth (AOD₅₅₀) weekly patterns were defined with the use of the satellite-based index and 6 regions of interest were selected. A second method was used afterwards for the investigation of the weekly variability and the statistical significance of the weekly cycle over the selected regions. The weekly cycle was also examined on a seasonal basis. An effort to correlate the differing aerosol weekly variability appearing over different regions in Europe with the dominating synoptic wind patterns is presented here. For this, synoptic wind speed and direction from the NCEP/NCAR reanalysis dataset were used in conjunction with the MODIS datasets. The same procedure was then repeated for total cloud cover (TCC), and the cloud weekly patterns were compared to the aerosol weekly patterns. The general AOD₅₅₀-TCC relationships for the 6 regions of interest were calculated on a seasonal basis. The ability of these relationships to reproduce the weekly variability of TCC from the weekly variability of AOD₅₅₀, manifests the aerosol impact on the weekly cycle of cloud coverage over Europe.