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A synoptic characterization of the Saharan dust transport in the Mediterranean basin

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In this work the capability of Circulation Types Classification (CTC) methods to characterize the daily Saharan dust transport in the Mediterranean region is studied. The dust loads are estimated through the AOD simulated by the GOCART model in the period 2000-2007, and measured by the NASA-MODIS in the period 2001-2010. The dust transport from the Sahara is identified linking the AOD anomalies to the southerly thermal advections into the Mediterranean, through a Maximum Covariance Analysis (MCA) of AOD and air temperature at 850 hPa from NASA-MERRA. The time-series of the expansion coefficients associated to the first two modes, explaining around 90% of the covariance, allow to describe the dust transport and thermal advection anomalies in the eastern, western and central Mediterranean subregions. The circulation types are classified using the MERRA geopotential height at 700 hPa in the period 1979-2010. Two classification methods are tested, based on time-mode and space-mode Principal Component Analysis (PCA), with 6, 10 and 14 classes. The CTC performance in the characterization of the dust transport and thermal anomalies is evaluated, and the best method is selected. Results show that a time-mode PCA method with 14 classes allows the characterization of dust transport and thermal anomalies in the eastern and western Mediterranean, while the anomalies in the central Mediterranean is well characterized by a space-mode PCA method with 10 classes.