A SYNOPTIC CHARACTERIZATION OF THE DUST TRANSPORT AND ASSOCIATED THERMAL ANOMALIES IN THE MEDITERRANEAN BASIN

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In this work the possibility to characterize the daily dust transport and associated thermal anomalies in the Mediterranean through Circulation Types Classification (CTC) methods is explored.

The dust loads are estimated through two different sources: the Aerosol Optical Depth (AOD) simulated by the Goddard Chemistry Aerosol Radiation and Transport (GOCART) model in the period 2000-2007, and AOD remote sensed by the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) in the period 2001-2010.

The dust transport from the Sahara is identified linking the AOD anomalies to the thermal anomalies into the Mediterranean, studying the covariance modes of AOD and air temperature at 850 hPa from the NASA Modern Era Retrospective-analysis for Research and Applications (MERRA) dataset. The time-series of the expansion coefficients associated to the first two modes, explaining around 90% of the total covariance, allow to describe the dust transport and thermal anomalies in the eastern, western and central Mediterranean subbasins.

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 t-mode and s-mode Principal Component Analysis (PCA), with 6, 10 and 14 classes. The performance of the CTC methods in the characterization of the dust and thermal anomalies is evaluated, and the best method is selected.

Results show that a t-mode PCA method with 14 classes allows the characterization of dust transport and thermal anomalies in the eastern and western Mediterranean, while the variability in the central Mediterranean is well characterized by a s-mode PCA method with 10 classes.