Origin of air masses arriving in SE Spain. Relationship with TOMS AI and PM10 levels

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A cluster analysis of 96 and 72h trajectories arriving in Elche (38.3N, 0.7W) at 3000, 1500 and 500m during 2004 has been performed to identify and describe the main flows arriving in SE Spain and to relate them to the TOMS Aerosol Index (AI) and PM10 values in this area.

The k-means clustering method was used with the procedure described by Dorling et al. (1992) to reduce the subjectivity in the selection of the appropriate number of clusters. We compare a method for cluster centroids initialization using synthetic seeds (Mattis, 2001) with other methods that make use of real trajectories. Results are sensitive to the initial selection of cluster centroids, although final classifications are qualitatively similar.

The dependence of the TOMS AI and PM10 values on the air mass origin is statistically significant. PM10 levels present the highest differences with the air masses arriving at 3000m, but are also related to local/regional events and to atmospheric parameters that are discriminated by the clustering analysis as well.