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Objective classification of the tropospheric vertical structure in SE Spain from radiosonde data

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Data from the Murcia sounding station (38.00N, 1.17W, 61m asl, 39 km inland) has been used to study the tropospheric vertical structure in the western Mediterranean. A classification of the vertical profiles of four normalized variables (THTA, MIXR and the northern and eastern components of the wind velocity) at 12Z for the period 2000–2006 has been performed by a k-means cluster analysis. The tropospheric structure is found to be classified into seven profile types that show strong seasonality and correspond to distinct synoptic situations.

We describe in detail the features of each of the seven vertical structure types and summarize our results concerning their relationship to precipitation and the air quality in the area. Differences found when averaging over days both affected and not by African dust outbreaks are also addressed.