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Temporal and spatial variations of migratory anticyclones affecting the Mediterranean

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Migratory cyclones and anticyclones mainly account for the short-term weather variations in extra-tropical regions while their frequency of occurrence and tracks are important elements of the synoptic climatology of the areas they affect. By contrast to cyclones that have drawn major scientific attention due to their direct link to active weather and precipitation, climatological studies on anticyclones are limited, even though they also are associated with extreme weather phenomena and play an important role in global and regional climate. This is especially true for the Mediterranean, a closed basin with complex topography, particularly vulnerable to climate change.

For the construction of a comprehensive climatology of migratory anticyclonic systems in the Mediterranean using an objective methodology, the Melbourne University automatic tracking algorithm is applied. The climatology is based on the ERA-Interim mean sea level pressure dataset on 1.5°x1.5° resolution, covering the period of 1979-2012. The scheme is employed for the first time for anticyclone tracking in the Mediterranean region and for this reason its robustness and reliability in efficiently capturing the individual characteristics of the anticyclonic tracks in the Mediterranean have been checked and verified.

The objective of this study is to investigate the intra-annual variations of the frequency of the anticyclonic tracks affecting the Mediterranean basin, along with the system density distribution. The temporal and spatial variability of anticyclonic features, such as intensity, anticyclogenesis and anticyclolysis are also explored and the anticyclonic tracks are classified in sectors according to their origin domain.

The highest frequency of anticyclonic occurrence is found over continental areas, where a high number of migratory anticyclones prefer to move on paths parallel to the northern (from Iberian towards the Balkan Peninsula) and southern (North African coast) Mediterranean barriers. The highest frequency over maritime areas occurs at the Black Sea and the Gulf of Syrtes, i.e. closed areas exhibiting also maxima of anticyclogenesis. A displacement of the system density and anticyclogenesis maxima is evident throughout the year, due to the seasonal variability of the two main permanent systems that are involved in the study area; the Siberian and the Azores anticyclones.

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