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The implementation of an automated tracking algorithm for the track detection 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. 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 region particularly vulnerable to climate change, and the little research which has been done is essentially confined to the manual analysis of synoptic charts.

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, based to the ERA-Interim reanalysis mean sea level pressure database. The algorithm's reliability in accurately capturing the weather patterns and synoptic climatology of the transient activity has been widely proven. This algorithm has been extensively applied for cyclone studies worldwide and it has been also successfully applied for the Mediterranean, though its use for anticyclone tracking is limited to the Southern Hemisphere.

In this study the performance of the tracking algorithm under different data resolutions and different choices of parameter settings in the scheme is examined. Our focus is on the appropriate modification of the algorithm in order to efficiently capture the individual characteristics of the anticyclonic tracks in the Mediterranean, a closed basin with complex topography. We show that the number of the detected anticyclonic centers and the resulting tracks largely depend upon the data resolution and the search radius. We also find that different scale anticyclones and secondary centers that lie within larger anticyclone structures can be adequately represented; this is important, since the extensions of major anticyclonic systems affect the Mediterranean basin throughout the year.

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