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A new tracking algorithm for cyclones with tropical characteristics in the Mediterranean basin

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Given their potential to damage coastal zones, cyclones with tropical characteristics have been profoundly studied, although their genesis and development mechanisms are not fully established yet. Being less severe and shorter than their tropical counterparts, the so-called medicanes are storms within the mediterranean basin with certain tropical characteristics. One of the most important factors that determine the impacts of these tropical-like storms is their trajectory. Thus, the detection and tracking algorithms have been object of numerous studies since the origins of numerical weather prediction.

Due to their similarities with tropical cyclones, the same algorithms should in principle be suitable for these Mediterranean storms, even if some minor changes become necessary considering that they differ in size, duration and intensity. Despite these similarities, there seems to be no consensus on the best algorithm for medicanes tracking. Although some of the existing specific algorithms for tropical cyclones are of a very high spatial accuracy, there are some difficulties that need further assessment and discussion when applying them to medicanes, such as the existence of more intense non-tropical systems within the domain of study, the coexistence of multiple medicanes or interferences due to large orographic barriers. The development of specific medicanes detection and tracking algorithms is not an unspoiled matter and some methods have been developed for this purpose. Nevertheless, their applicability is limited when the aforementioned adversities come into play.

Our aim is to propose and evaluate a new algorithm specifically suited for medicanes tracking, flexible, robust and able to detect and track them even in the mentioned adverse conditions. This algorithm consists in the implementation of a time independent methodology allowing the automated detection of simultaneous tropical-like cyclones within the same domain. It also provides the possibility of an easy modification of the cyclone definition parameters to make it useful for the detection of different cyclone types. The computational efficiency and time-saving

performance are key factors to take into account for the development of this algorithm. Consequently, it should also be suitable for medicanes climatological studies.