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CycloTRACK (v1.0) – tracking winter extratropical cyclones based on relative vorticity: sensitivity to data filtering and other relevant parameters

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Abstract. In this study we present a new cyclone identification and tracking algorithm, cycloTRACK. The algorithm describes an iterative process. At each time step it identifies all potential cyclone centers, defined as relative vorticity maxima embedded in smoothed enclosed contours of at least $3 \times 10^{-5} \text{ s}^{-1}$ at the atmospheric level of 850 hPa. Next, the algorithm finds all the potential cyclone paths by linking the cyclone centers at consecutive time steps and selects the most probable track based on the minimization of a cost function. The cost function is based on the average differences of relative vorticity between consecutive track points, weighted by their distance. Last, for each cyclone, the algorithm identifies "an effective area" for which different physical diagnostics are measured, such as the minimum sea level pressure and the maximum wind speed. The algorithm was applied to the ERA-Interim reanalyses for tracking the Northern Hemisphere extratropical cyclones of winters from 1989 until 2009, and we assessed its sensitivity for the several free parameters used to perform the tracking.

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