

Development and application of neighbour enclosed area tracking

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Most of conventional cyclone tracking algorithms have been developed with an identification of cyclone centre and a minimisation of distance of the centre between guess and observation. This study developed a novel tracking algorithm characterised by the tracking for an overlapping image between adjacent timeframes as an application of connected component labelling technique in the image processing field. This algorithm enabled us to evaluate merge and split of cyclones that have not identified in conventional algorithms. Climatological merge is frequent in the east of Japan, especially along Kuroshio Extension region, and climatological split often occurs in the eastern North Pacific and the North Atlantic, where the wave mean-flow interaction is active. This feature is consistent with previous synoptic analyses. This algorithm also explored a shape of eddies by fitting an enclosed area into an oval. The analysis for upper tropospheric eddies in Northern Hemisphere winter revealed that the eddy orientation was correlated with the eddy momentum transport, or the Arctic Oscillation index. This algorithm was moreover applied to the tracking of tropical cyclones and that of oceanic meso-scale eddies.

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