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Objective identification of warm seclusion cyclones and their distribution

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A primary feature of the lifecycle of extratropical cyclones that follow the Shapiro-Keyser (SK) model is the warm seclusion that forms at the centre of the low. Studies have suggested that some cyclones in the Northern Hemisphere follow this (SK) lifecycle, and others follow a lifecycle more akin to the Norwegian model.

Here an objective method is used to identify warm seclusions in 100 cyclones from the North Atlantic and 100 cyclones from the North Pacific storm-tracks in data from the ERA-Interim reanalyses. The cyclones are first identified from maxima in the 850 hPa relative vorticity and are then tracked in time. Warm seclusions are identified as closed contours of potential temperature at 850hPa. The statistics of these features are presented and the study finds that more cyclones in the North Pacific than North Atlantic develop warm seclusions. Composites of the warm-seclusion cyclones exhibit other notable features such as a strong warm front. The effect of the large-scale flow on the occurrence of warm-seclusion cyclones is also investigated.