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Classifying Southern Hemisphere extratropical cyclones

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There is a wide variety of flavours of extratropical cyclones in the Southern Hemisphere, with differing structures and lifecycles. Previous studies have classified these manually using upper level flow features or satellite data. In order to be able to evaluate climate models and understand how extratropical cyclones might change in the future, we need to be able to use an automated method to classify cyclones.

Extratropical cyclones have been identified in the Southern Hemisphere from the ERA-Interim reanalysis dataset with a commonly used identification and tracking algorithm that employs 850hPa relative vorticity. A clustering method applied to large-scale fields from ERA-Interim at the time of cyclone genesis (when the cyclone is first identified), has been used to objectively classify these cyclones in the Southern Hemisphere. This simple method is able to separate the cyclones into classes with quite different development mechanisms and lifecycle characteristics. Some of the classes seem to coincide with previous manual classifications on shorter timescales, showing their utility for climate model evaluation and climate change studies.