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Precipitation in atmospheric fronts in observations and a climate model

Jennifer Catto[†]; Christian Jakob; Gareth Berry
[†] Monash University, Australia
Leading author: jennifer.catto@monash.edu

Atmospheric fronts are hugely important for the day-to-day variability of weather in the midlatitudes, particularly during winter when extratropical storm-tracks are at their maximum intensity. Fronts are often associated with heavy rain, and are important for the local climatological precipitation. Although global climate models should be expected to represent the baroclinic systems within which the fronts are embedded, the fronts themselves and precipitation processes within them are of much smaller scale. As a consequence, these features are not necessarily easily captured by models with typical horizontal resolutions of contemporary climate models. A recently developed objective front identification method applied to reanalysis data will be combined with a daily global rainfall data set to investigate how much precipitation around the globe is associated with atmospheric fronts. The study will cover both extratropical frontal features associated with mid-latitude baroclinic systems and sub-tropical "fronts" such as the South Pacific Convergence Zone (SPCZ). Having established the observed distribution of fronts and their role in producing precipitation, the occurrence of fronts and the associated precipitation is then evaluated in a state-of-the-art climate model, the Australian Community Climate and Earth System Simulator (ACCESS). The evaluation will highlight issues in the model in locating frontal features correctly, as well as identifying the within-front rainfall distribution, thereby providing a methodology for the evaluation of the broader CMIP5-familiy of climate models in a process-oriented fashion.