Geophysical Research Abstracts
Vol. 16, EGU2014-4609, 2014
EGU General Assembly 2014

The importance of fronts for extreme rainfall

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Extratropical cyclones and their associated frontal systems are well-known to be related to heavy precipitation events. Here an objective method is used to directly link extreme precipitation events with atmospheric fronts, identified using ECMWF Interim Reanalysis data, to quantify the importance of fronts for precipitation extremes globally.

In parts of the major midlatitude storm track regions, over 90% of precipitation extremes are associated with fronts, with slightly more events associated with warm fronts than cold fronts. A large proportion of extreme precipitation events occur in the presence of both a cyclone and a front, but remote fronts are responsible for many of the "front-only" events. The fronts producing extreme precipitation events are found to have up to 35% stronger frontal gradients than other fronts, potentially providing some improved forecasting capabilities for extreme precipitation events.