



Climatology and dynamics of the link between dry intrusions and cold fronts

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The conceptual picture of an extratropical cyclone typically includes warm and cold fronts and various airflows, including the dry intrusion (DI). The DI is a stream of air descending from the upper troposphere behind the cold front. This may have a dynamical impact on the cold front and the cold sector behind it, helping to produce instability and potentially convective activity. Here we have used a climatology of DIs produced using a Lagrangian trajectory analysis, and an objective climatology of cold fronts to investigate the climatological link between DIs and cold fronts. The cold fronts have been separated into different types: central fronts, where the front lies within the closed pressure contours of a cyclone; trailing fronts, where the front is connected to a central front but lies outside the closed pressure contours; and isolated fronts that exist away from a cyclone.

The global spatial distribution of the different types of cold fronts linked to DIs will be presented, along with evidence that cold fronts linked to DIs tend to have stronger temperature gradients than those not linked to DIs. Composites of the fronts and their associated cold sectors show that trailing fronts associated with DIs have deeper cyclones and deeper upper level troughs, and also produce more precipitation and stronger wind gusts. The results for the isolated fronts show some similar features to the trailing fronts, but also some differences associated with differing front strengths.