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Structures of moisture transport to Norway associated with winter cyclones in the North Atlantic

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Understanding of the atmospheric processes leading to periods of extreme precipitation is still limited. Previous studies have shown that both, remote and local moisture transport contribute to heavy precipitation events in Norway and the American West coast via moisture conveyor belts or 'atmospheric rivers', which are linked to mid-latitude cyclones. In this work we want to gain more insight into the processes and the structures of moisture transport associated with mid-latitude cyclones.

We studied a period of above-average precipitation in southern Norway during winter 2006/07, which was related to a series of mid-latitude cyclones moving into the Scandinavian land mass. A number of high-resolution simulations was conducted with a limited-area NWP model, using ECMWF's high-resolution operational data. The limited-area model has been fitted with water vapour tracers, which allow to tag water vapor at its area of evaporation, and to follow it's movement through the model's hydrological cycle.

We determined the evaporation sources for precipitation in southern Norway for several mid-latitude cyclones. A new composite visualisation of water tracers reveals which areas of the cyclones are associated with long-range vs. short-range water transport. In addition, the temporal evolution of the associated precipitation in southern Norway from the various evaporation sources is presented. Our simulations show that a variety of latitude-longitude sectors in the North Atlantic can provide substantial amounts of moisture to a cyclone and precipitation in southern Norway, including the sub-tropcial North Atlantic. Our results have implications for understanding the role of SST anomalies in precipitation extremes, and provide new insight into the mecha-

nisms of moisture transport in and precipitation from mid-latitude cyclones.