Geophysical Research Abstracts
Vol. 17, EGU2015-1925, 2015
EGU General Assembly 2015


# How do atmospheric rivers form?

Helen Dacre
University of Reading, Department of Meteorology, Reading, United Kingdom (h.f.dacre@reading.ac.uk)

The term atmospheric river is used to describe corridors of strong water vapor transport in the troposphere. Filaments of enhanced water vapor, commonly observed in satellite imagery extending from the subtropics to the extratropics, are routinely used as a proxy for identifying these regions of strong water vapor transport. The precipitation associated with these filaments of enhanced water vapor can lead to high impact flooding events. However, there remains some debate as to how these filaments form. In this study we analyse the transport of water vapor within a climatology of wintertime North Atlantic extratropical cyclones.

Results show that atmospheric rivers are formed by the cold front which sweeps up water vapor in the warm sector as it catches up with the warm front. This causes a narrow band of high water vapor content to form ahead of the cold front at the base of the warm conveyor belt airflow. Thus, water vapor in the cyclone's warm sector, and not long-distance transport of water vapor from the subtropics, is responsible for the generation of filaments of high water vapor content. A continuous cycle of evaporation and moisture convergence within the cyclone replenishes water vapor lost via precipitation. Thus, rather than representing a direct and continuous feed of moist air from the subtropics into the centre of a cyclone (as suggested by the term atmospheric river), these filaments are, in-fact, the result of water vapor exported from the cyclone and thus they represent the footprints left behind as cyclones travel polewards from subtropics.