



The concurrence of Atmospheric Rivers and explosive cyclogenesis in the North Atlantic and North Pacific basins

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The explosive cyclogenesis of extra-tropical cyclones and the occurrence of atmospheric rivers are characteristic features of a baroclinic atmosphere, and are both closely related to extreme hydrometeorological events in the mid-latitudes, particularly on coastal areas on the western side of the continents. The potential role of atmospheric rivers in the explosive cyclone deepening has been previously analysed for selected case studies, but a general assessment from the climatological perspective is still missing. Using ERA-Interim reanalysis data for 1979-2011, we analyse the concurrence of atmospheric rivers and explosive cyclogenesis over the North Atlantic and North Pacific Basins for the extended winter months (ONDJFM). Atmospheric rivers are identified for almost 80% of explosive deepening cyclones. For non-explosive cyclones, atmospheric rivers are found only in roughly 40% of the cases. The analysis of the time evolution of the high values of water vapour flux associated with the atmospheric river during the cyclone development phase leads us to hypothesize that the identified relationship is the fingerprint of a mechanism that raises the odds of an explosive cyclogenesis occurrence and not merely a statistical relationship. These new insights on the relationship between explosive cyclones and atmospheric rivers may be helpful to a better understanding of the associated high impact weather events.