



Atmospheric rivers in the Mediterranean Sea

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Atmospheric river (AR) concept refers to narrow elongated regions of high water vapor concentration. They are an important large-scale driver of heavy precipitation that both lead to floods and produces valuable water supply. ARs are typically located within the warm sector of midlatitude storms over the ocean and their impacts have widely assessed in many worldwide regions over land. However, how ARs impact to the seas and if we can find similar structures over the seas is still poorly understood. Here, ARs are analyzed with twofold aim; 1) understand how ARs from the Atlantic ocean are able to penetrate into the Mediterranean sea and, 2) find similar structures to ARs (i.e. large filaments with high water vapor) in the Mediterranean.

In this analysis, two databases are assessed for the period from 1980 to 2010: NCAR/NCEP and ERA-Interim reanalysis. To identify the ARs, the integrated vapor transport (IVT) is computed and a classification of the events that exceed a threshold of IVT is performed. The classification method combines principal component analysis and clustering techniques. Results show that the more vigorous ARs able to reach the Mediterranean Sea are those that penetrate from the strait of Gibraltar and from the Garonne mouth to Lion gulf. Also, elongated regions with large IVT were found but with significantly lower intensity and persistence than the typical ARs over the oceans.