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Anomalous Moisture Transport for the “Great Arctic Cyclone of August 2012”

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On August 2012 an especially intense cyclone reached the Arctic basin coinciding with the previous days of the lowest sea ice extent experimented over the Arctic on the last decades. Because of its special conditions, it was denoted as the “Great Arctic Cyclone”. This storm, with a total lifetime of 13 days and firstly detected over Siberia, crossed the Arctic ocean from the East Siberian Sea to the Canadian archipelago; achieving a central pressure of 966 hPa on 6 August.

Despite this cyclone was previously studied, as far as we know any analysis was performed referred to the moisture evolution of the storm of where this moisture comes from. On the present work, an analysis of the moisture sources for the cyclone was realized using the Lagrangian model FLEXPART. The trajectory of the cyclone was identify using the minimum value of the sea level pressure over the Arctic from the NCAR reanalysis. Then, the areas of maximum moisture uptake affecting the cyclone were identified along the trajectory taking into account the position at 12UTC for every day and their anomaly was analyzed referred to the climatological moisture sources over the period 1980-2015.

In general, an intensification of moisture uptake was found on every day of the trajectory. On the first two days of the cyclone development moisture sources highly intensify especially over northern Siberia (around the cyclone) and central Europe. On the third day, just before entering the Arctic Ocean, high anomalies on moisture uptake can be found over continental areas over Eastern China and Russian Far East. On the following days, despite positive anomalies appears, the intensification is lower. From the fourth day, moisture uptake from oceanic regions begins to be relevant especially over the Bering Sea on seventh and eighth days of the trajectory. On the tenth day, important moisture uptake intensification appears over North America, where positive anomalies appear until the cyclone disappears.

To conclude, a general intensification of moisture uptake was found for the complete cyclone trajectory being this intensification on the first days of trajectory over continental areas and decreasing as the cyclone reach the ocean.