A Synoptic-Dynamic Investigation of the Flood in Sistan and Baluchestan and the Heavy Snowfall in Gilan in winter 2020

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Abstract

A synoptic perspective was adopted in this study to investigate two winter precipitation systems that caused a flood in Sistan and Baluchestan and a heavy snowfall in Gilan in January 9-12 and February 9-12, 2020, respectively. The results demonstrated that although different in shape, both systems were cold-core and similar in their formation and strengthening. Amplification of the mid-level trough, formation of cyclonic rotation, positive relative vorticity advection to the east of the trough, convergence in lower levels, and formation or strengthening of low-pressure at the Earth's surface to the east of the trough, played the key role in developing and strengthening these two systems. These mechanisms are consistent with the theory of development and strengthening of mid-latitude low-pressure systems. A noticeable difference between these two systems is the continuity and increasing speed of the north wind in the first system, caused by the meridional shift in the polar jet stream. These conditions have caused the cyclonic curvature formed in the subtropical jet stream axis in the first system to be increase and extended to the south. These curvatures are located to the east of the Red Sea in the first system and northeast of the Mediterranean Sea in the second system. Also, in the first system, the advection of warm moist air from the Arabian Sea and the Gulf of Oman, and in the second system, the advection of cold air from the Caspian Sea have provided suitable conditions for convectional rainfall and heavy snowfall, respectively.

Keywords: Heavy Snowfall in Gilan, Flooding in Sistan and Baluchestan, Cut-off Low

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