EFFECTS OF THE MADDEN-JULIAN OSCILLATION ON GENERALIZED FROSTS IN CENTRAL SOUTHERN SOUTH AMERICA

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ABSTRACT

Extreme cold events can be extremely dangerous to the society, leading to damages in agriculture, livestock, and event deaths. The processes responsible for these cold events includes complex interaction mechanisms at different atmospheric scales. The frost events that affect central and northeastern Argentina are associated with a double wave train in the subtropical and polar jet streams and to an intense polar air advection. However, mechanisms that interacts with these wave trains, such the Madden Julian Oscillation, can alter the patterns of temperature, intensifying or weakening these cold events. This study aims to investigate the impacts of the MJO phases on the extreme cold events on central southern South America during the winter. The generalized frosts days are defined as days on which minimum temperatures below 0º were recorded at more than 75% of meteorological stations in the Pampas. The composites for the highest and lowest number of episodes in the period of 1979-2010 of different meteorological variables were evaluated. MJO events were defined using a MJO index based on empirical orthogonal functions analysis of zonal wind and Outgoing Longwave Radiation (OLR). The results shows that the intensification of the cold events are associated with a single extratropical wave train and the weakening are related with a double wave train, one at the tropics and another in the extratropics. Moreover, the position of the convection associated with the MJO can influence the number of extreme cold events and its intensity.

Key words: frosts, MJO, southern South America.