



Observational analysis and large-scale pattern associated with cold events moving up the equator line over South America

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Abstract

An observational study was carried out to quantify the events of cold air outbreak moving above the Equator from 1980 to 2013 during the austral winter period (May, June, July, August and September), and later analyzed the behavior of the circulation responsible for this displacement. The observational datasets from the Sector of Climatological studies of the Institute of Airspace Control of the city of Iauaretê (0.61N, 69.0W; 120m), located at the extreme northern of the Brazilian Amazon Basin, were used for the analyzes. The meteorological variables used were the temperatures minimum, maximum and maximum atmospheric pressure. A new methodology was used to identify these events, calculated by the difference between the monthly average and 2 (two) standard deviations for the extremes of the air temperature, and the sum of 1 (one) standard deviation for the maximum atmospheric pressure. As a result, a total of 11 cold events were recorded that reached the extreme northern of the Brazilian Amazon Basin, with values recorded at a minimum temperature of 17.8 de °C, at the maximum temperature of 21.0 °C and maximum atmospheric pressure reaching 1021.2 hPa. These reductions and augmentation are equivalent to the negative anomalies of 5.9 and 8.7 °C at the minimum and maximum temperatures, respectively, while a positive anomaly of 7.1 hPa was observed at the maximum pressure. In relation to the dynamic behavior of large-scale circulation, a Rossby wave-type configuration propagating from west to east over subtropical latitudes was observed from the European Center for Medium-Range Weather Forecast (ECMWF) since the days before the arrival of the event in the city of Iauaretê. This behavior was observed both in the anomalies of the geopotential (250 hPa and 850 hPa) and in the southern component of the wind (250 hPa and 850 hPa), both presenting statistical significance of 99 % (Student's T test). Therefore, a new criterion for the identification of "friagens" in the tropical latitude has been able to represent the effects of colds air outbreak and the advancement of the cold air mass, which are subsidized by the large-scale circulation, and consequently contribute to the modifications in the weather and the life of the population over this Equatorial region.

keywords: "friagens", Amazonian, Rossby

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