

Winter's Precipitation Variability in Portugal: A Case Study Perceived by means the ANN Meteorological Time Series Reconstruction.

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The present study analyses recent variations in some precipitation characteristics in Portugal, particularly the winters from 1999 to 2004. The time series recorded by the National Meteorological Institute at seven weather stations in Portugal from 1901 up to 2004 were analyzed, looking for the occurrence of abrupt changes and trends. The studied variables include monthly and annual total precipitation, monthly number of rainy days and the duration of the rainy season. A previous analysis of the homogeneity of the time series was achieved, applying the Wald-Wolfowitz, Spearman and Mann-Kendall methods. Particular changes were detected in some time series of annual precipitation and number of rainy days. However, it was possible to identify the sub-periods prior to and after the change points, which may be considered to be homogeneous. The series of variables related to the duration of the rainy season were also analyzed. Significant variations in the total precipitation from 1999 to 2004 were detected. The analyses of the monthly total precipitation within this period pointed out a strong anomaly in November, due to a reduction in the frequency of rainy days and in the intensity of precipitation. The daily synoptic conditions were analyzed during the selected month (November) from 1999 up to 2004, showing that the prevailing synoptic systems over the region changed during the selected month. The depressions associated with the polar frontal system that characterize the precipitation regime over the region did scarcely occur, since the frontal system moved to abnormally high latitudes. The Azores high pressure system was almost permanently located over the Iberian Peninsula. For each day of every November within the period from 1999 till 2004 an anticyclonic pattern over Iberian Peninsula was systematically observed. A persistent subsidence aloft results in a semi-permanent inversion which suppresses vertical development of low clouds, hence inhibiting precipitation.