Trend analysis of precipitation in the Madeira Archipelago

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Knowledge of the regional environmental and hydro-climatic conditions is of the utmost importance to the sustainable management of water and other resources in particularly vulnerable regions (e.g. islands). The purpose of this work is to contribute to a better understanding of the variability of precipitation in the Madeira archipelago (Portugal) by investigating trends in the temporal structure of this process.

This archipelago is located in North Atlantic Ocean, about 900 km from Mainland Europe. It is formed by the Madeira and Porto Santo Islands, and by two other groups of inhabited small islands (Desertas and Selvagens). The area of Madeira Island is 728 km2, and the coordinates of its centre are 32ž45'N and 17ž00'W. Porto Santo Island, with an area of 42 km2, is situated 40 km to the northeast of the main island.

Madeira Island is characterized by a strong orography; the highest altitude is 1862 m; the highest point on Porto Santo is 517 m. The spatial variation of climatic conditions in these islands is greater than in most continental regions. This marked spatial variability of precipitation, combined with a high temporal variability, has a strong impact on society, economic activities (e.g. tourism, agriculture), land use and water resources.

The study uses homogeneous precipitation data from several locations in the islands. The data are analyzed with statistical methods to test for data serial correlation (Wald-Wolfowitz test) and the presence of trends (Mann-Kendall trend test; Sen's non-parametric method). Results of the trend analysis are compared with studies of precipitation reported for Continental Europe, in particular for Mainland Portugal.

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