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Changing patterns of extreme hydrological events in Morocco

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Morocco experiences a semi-arid climate with both Mediterranean and Atlantic influences, causing a strong variability of rainfall. It has also high mountain ranges from North to South, separating vast regions with contrasted climatic and hydrologic conditions. In this context, Morocco is highly vulnerable to extreme hydrological events, such as floods and extended drought periods, impacting the population and the economic activities. In a global change context, there is a need to investigate whether these hydrological extremes are becoming stronger since an increased vulnerability has been observed in the last decades. Here, we analyzed long-term time series of daily flows from 17 basins located in the North (Mediterranean: Loukkos), in the center (Atlantic: Bourgreg, Oum Errabia) and in the South Western (Tensift, Souss, Massa, Draa) of Morocco. The objective is to evaluate the evolution of floods and low-flows in a regional perspective. For that purpose, statistical models for extreme values allowing non-stationarity are used in combination with trend-detection tests. The results showed increasing trends in maximum annual flows only at two stations in central Morocco, while decreasing trends in the north and south prevail. On the contrary, changes in low-flows and river intermittency are more widespread across the basins with contrasted climatic conditions.