



## **Abrupt decadal-to-centennial hydroclimate changes in the Mediterranean region since the mid-Holocene**

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A series of severe drought events in the Mediterranean region over the past two decades has posed a threat on both human society and biosystem. Holocene hydrological dynamics can offer valuable clues for understanding future climate and making proper adaption strategy. Here, we present a decadal-resolved stalagmite record documenting various hydroclimatic fluctuations in the north central Mediterranean region since the middle Holocene. The stalagmite  $\delta^{18}\text{O}$  sequence shows dramatic instability, characterized by abrupt shifts between dry and wet conditions  $<50$  years. The timing of regional culture demises, such as the Hittite Kingdom, Mycenaean Greece, Akkadian Empire, Egyptian Old Kingdom, and Uruk, occurred during the drought events, suggesting an important role of climate impact on human civilization. The unstable hydroclimate evolution is related to transferred North Atlantic Oscillation states. Rate of rapid transfer of precipitation patterns, which can be pin-pointed by our good chronology, improves the prediction to future climate changes in North Atlantic region. We also found that a strong correlation between this stalagmite  $\delta^{18}\text{O}$  and sea surface temperatures especially in Pacific Ocean. This agreement suggests a distant interregional climate teleconnection.