



Winter precipitation changes during the Medieval Climate Anomaly and the Little Ice Age in arid Central Asia

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The strength of the North Atlantic Oscillation (NAO) is considered to be the main driver of centennial to decadal climate changes over the European and western Asian continents throughout the last Millennium. Over Europe, the predominantly warm Medieval Climate Anomaly (MCA) and the following cold period of the Little Ice Age (LIA) have been associated with long-lasting positive and negative NAO modes, respectively. The climatic imprints of these NAO modes are especially pronounced in European winter seasons. However, little is known about the eastern extent of the NAO anomalies over the Eurasian continent.

The speleothem records of Mount Keklik-Too (Kyrgyzstan, Central Asia) presented here reveal past climate variations during the last millennium. Present-day climate characteristics and seasonal changes of the cave environment suggest that winter and spring conditions govern the isotopic and Sr/ Ca variations of the stalagmite. The Keklik-Too records shows strong and simultaneous changes in these geochemical proxies that give evidence for severe variations in winter precipitation in the region over the last 900 years. Winter precipitation during the MCA was generally higher than during the LIA, which is in line with climatic changes linked to the strength of the NAO over Europe. Furthermore, several events of strongly reduced winter precipitation are observed during the LIA. These dry winter events can be related to phases of a strongly reduced strength of the NAO. These results reveal that winter precipitation over the central Eurasian continent is tightly linked to atmospheric NAO modes by the westerly wind systems.