Holocene summer temperature and biodiversity change recorded by Chironomidae in Western Mediterranean North Africa

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The western Mediterranean is one of the most sensitive regions to climate change globally and projections of future climate change in the region describe scenarios of increased heat stress and decreased water availability. Understanding regional hydroclimatic dynamics is therefore a research priority which has prompted several recent studies to describe hydroclimatic development throughout the Holocene (last 11,700 thousand years). However, despite recent efforts there remains a critical knowledge gap; how did summer temperature develop during the Holocene in the western Mediterranean and how did summer temperature development change moisture availability. Answering these questions is essential to understanding the magnitude of the threat posed to the western Mediterranean region by future climate change. The projected climatic changes also pose another issue for the sensitive western Mediterranean region, biodiversity loss caused by anthropogenic activity. In particular, the magnitude of recent biodiversity loss in North Africa is unknown because local records of biodiversity change are either incomplete or lacking. In this project we aim to address both of these knowledge gaps by producing a new Holocene-long summer temperature reconstruction and a new Holocene-long record of aquatic biodiversity change from the Middle and High Atlas Mountains, Morocco.We will conduct our analysis by utilising the preserved remains of Chironomidae (Diptera). The assemblages of chironomid larvae living in lakes have been shown to have a statistically significant relationship with air temperature in Switzerland, Norway, Svalbard, Finland, Iceland, Canada, northern Russia, Tasmania, New Zealand and East Africa however, the relationship has not yet been described in the Western Mediterranean. Our first action will be to describe the chironomid-summer air temperature relationship in the western Mediterranean using a new set of modern chironomid assemblages from the Middle and High Atlas Mountains. We will then produce a record of Holocene chironomid assemblage change from Lake Sidi Ali, Morocco, by analysing preserved chironomid remains in lake sediments. By statistically comparing new Holocene chironomid assemblage change record with the new set of modern chironomid assemblages from Morocco, we will produce a chironomid-based summer air temperature reconstruction for the Holocene, as has been done for other regions in previous studies. We will then use the same Holocene chironomid assemblage change record to reconstruct aquatic biodiversity change in lake Sidi Ali during the Holocene. Furthermore, we will produce an additional three records of recent aquatic biodiversity change from Middle and High Atlas sites. These analyses will show how aquatic biodiversity has changed in response to recent anthropogenic change and the Sidi Ali Holocene record will provide a long-term context with which to assess recent biodiversity change.