FOSSIL ORGANISM SIZE AS A PALAEOCLIMATE PROXY FOR DEEP TIME – PROSPECT AND FIRST RESULTS

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Modelling of the climate of the past is crucial for understanding the geological history as well as aiding us in predicting future climate changes. A wide variety of proxies have been used to look into the climates of the past. Yet, it is important to remember that most of the proxies, such as oxygen isotopes, palaeomagnetism, palynological profiles, and lithology, are only efficient under certain conditions. That limits the amount of fossil deposits available for palaeoclimatological reconstructions. Fossil fauna shave been often used as climate proxies, albeit mostly in a qualitative way – by the relation of certain groups of animals to certain climatic conditions. One of the most widely used quantitative proxies in palaeoclimatology is a reconstruction of the temperatures in the Quaternary based on the profiles of subfossil remnants of Chironomidae (Diptera) in lake sediments. However, this method only works well because most of these Quaternary species still exist, and we can observe their temperature preferences directly today. We do not have such options for the faunas of the Triassic or, let's say, the Eocene. Therefore, another type of quantitative proxies is required. The size of animals is to a large degree regulated by environmental factors, in particular temperature. Numerous size-temperature relationships are known in animals, Bergmann's rule being one of the most famous. Numerous groups of insects, such as Chironomidae mentioned above, can be used to test viability of size as a temperature proxy in palaeontology, due to their high abundance in numerous fossil deposits. Our first analysis, based on over 4,000 extant and fossil specimens of Chironomidae, shows that these insects are getting larger with increasing temperature. Our results show that while size of Chironomidae can be used as a palaeclimate proxy, taphonomic biases in the size of the animals during preservation pose a significant challenge.