



## **Continental climate reconstruction for the Miocene of Western Europe: mammal point of view**

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Continental climate evolution between 17 Ma and 9 Ma (Burdigalian to Tortonian) has been reconstructed quantitatively to span through the Miocene climatic optimum. Three areas of Western Europe have been investigated: Southern Germany, Centre-East France and Southern France.

Two independent approaches have been carried out using mammals as proxies for the quantitative palaeoclimatic reconstruction: a geochemical and an ecological one. The geochemical approach is based on the relationship since long evidenced between climate and oxygen isotope composition of mineralised parts of organisms: oxygen isotope composition in organism depends mainly on composition of freshwater intake which is strongly dependent on air temperature. The ecological approach is based on climatic control on the distribution of mammal species richness, as evidenced for extant mammals of the world. In our study, both methods give generally concordant temperature estimates. During the Middle Miocene, between 15 Ma and 13 Ma, maximum temperatures (up to 18°C) are reached in the three areas. This is followed by a decrease by up to 4°C, between 12 Ma and 10 Ma. In Southern France, though, this cooling is not observed, probably due to regional peculiarities.

Our evolution and range of values correlate quite well with previously published estimates provided by palaeoflora and ectotherm fauna data of Europe (Mosbrugger *et al.* 2005; Böhme *et al.* 2003). However, a delay of more than 1 Ma is observed between the beginning of the cooling in the ocean (marine  $\delta^{18}\text{O}$  curves; e.g., Zachos *et al.* 2001) and on land (our results). This gap raises the question of validity of correlations

between European continental and oceanic stratigraphic charts.

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