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Effect of changes in δ^{18}O content of the surface ocean on estimated sea surface temperatures in past warm climate

D.M. Roche (1), Y. Donnadieu (2), E. Pucéat (3), D. Paillard (2)

(1) Paleoclimatology and Geomorphology, Vrije Universiteit Amsterdam, The Netherlands (Didier.Roche@falw.vu.nl), (2) IPSL / Laboratoire des Sciences du Climat et de l'Environnement, Gif s/s Yvette, France (3) UB UMR 5561 Biogéosciences 6, Université de Bourgogne, Dijon, France

Using a coupled climate model of intermediate complexity including oxygen 18, CLIMBER-2, we investigate the evolution of the distribution of surface water ^{18}O composition under warm climate conditions. The warm climate simulation are performed with two different module for the ^{18}O cycle, enabling us to discuss the physical mechanisms behind these changes in details.
With these two ^{18}O module, we determine the impact of changes of the surface water ^{18}O distribution on ocean surface temperatures inferred from calcite oxygen 18. Our results show that published temperature reconstructions based on oxygen 18 from calcite are systematically biased by 2° to 4°C in the absence of major oceanic circulation changes and up to 7°C in the presence of major oceanic circulation changes. As the bias introduced is shown to vary with latitude, our work has major implications on past latitudinal temperature gradient reconstructions based on oxygen 18 measurements.