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Oligocene paleoceanographic history based on an interbasinal comparison of Cibicidoides spp. δ18O records and a new compilation of global data: a review

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Understanding Oligocene paleoceanographic changes is helpful for preparing the global warming in the future because the levels of atmospheric pCO_2 in the Oligocene were similar to those expected within the next century. However, the overall paleoclimatic and paleoceanographic history of the Oligocene still remain unclear even though our knowledge and technic have been improved by previous researches. In this study, we newly compiled Cibicidoides spp. δ18O records from global oceanic basin for the more reasonable assessment of the paleoceanographic changes during the Oligocene. We divided this Oligocene δ18O profile into five phases: an abrupt increase in δ18O values during the Eocene-Oligocene transition (EOT) (Phase 1), a gradual decrease in the early Oligocene (Phase 2), a long-term increase in the early to middle Oligocene (Phase 3), a gradual decrease in the late Oligocene (Phase 4) and an abrupt increase near the Oligocene– Miocene transition (OMT) (Phase 5). This Oligocene seesaw in the global scale δ18O profile is not likely to be directly connected to the strengthening and stratification of oceanic circulation related to the unidirectional strengthening of the Antarctic circumpolar current (ACC) and the North Atlantic Deep Water (NADW). Alternatively, we suggest that the invigorated oceanic circulation contributed to the interbasinal differences in δ18O values. For a more definite interpretation on the long-term δ18O changes during the Oligocene, future works will require the reconstruction of higher resolution and more reproducible data recording the changes of Antarctic ice sheets and atmospheric pCO_2 as well as information about the tectonic and paleoceanographic history.