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Constraint on age model of North Atlantic marine cores using O₂/N₂ chronology of the Dome Fuji ice core

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Investigation of the roles of different forcings (e.g. orbital variations and greenhouse gases) on climate requires a paleoclimate chronology with high accuracy ($\sim 1/10$ of precession cycle). Recently, we established such a chronology for the past 360 ky through orbital tuning of O₂/N₂ ratio of trapped air in the Dome Fuji and Vostok ice cores with local summer insolation. We here show the O₂/N₂ chronology back to ~ 500 kyr from the second Dome Fuji ice core, Antarctica. We find the duration of 11 ka, 5 ka, 9 ka, and 20 ka for MIS 5e, 7e, 9e and 11c interglacial periods in Antarctica. The termination onsets lag behind the Northern Hemisphere summer solstice insolation minima by 2-7 ka.

Marine sediment cores from northern North Atlantic contain millennial-scale signatures in various proxy records (e.g. SST, IRD), including abrupt climatic shifts and bipolar seesaw. Based on the bipolar correlation of millennial-scale events, it is possible to transfer our accurate chronology to marine cores from the North Atlantic. As a first attempt, the planktonic d₁₈O and IRD records from the marine core ODP 980 are correlated with Dome Fuji d₁₈O and CH₄ at the end of termination V and the first two millennial-scale events after MIS 11c. We find that the durations of plateaus of planktonic and benthic d₁₈O for MIS 11c are 20 and 15 ka, respectively, which are significantly shorter than originally suggested. These durations are similar to that of interglacial warmth in Antarctica. However, the onsets of interglacial levels in ODP980 for MIS 11 are significantly later than those in Antarctic d₁₈O and atmospheric CO₂ (by as much as ~ 10 ka), suggesting very long duration of ice sheet melting and northern high-latitude warming for termination V. The investigations on other interglacial periods and other marine cores are ongoing, and the results will also be reported.

Keywords: Ice core, Dome Fuji, O₂/N₂ age model, Interglacial period, Glacial period, Marine sediment cores