

Accurate chronology and climatic reconstruction around MIS 11 from the Dome Fuji ice core

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Marine Isotope Stage (MIS) 11 is characterized by long glacial termination and interglacial period, with higher sea level than today, despite moderate atmospheric CO₂ concentration and small variations in summer insolation (due to small Earth's orbital eccentricity). To investigate the roles of different forcings (e.g. orbital variations and greenhouse gases) on climate and ice sheets, paleoclimatic proxy records need to be accurately dated and precisely synchronized with each other. An accurate chronology for the past 360 ky was constructed through orbital tuning of O₂/N₂ ratio of trapped air in the Dome Fuji and Vostok ice cores with local summer insolation (Kawamura et al., 2007), and its improvement has been underway (Oyabu et al., this session). We are also extending the O₂/N₂ chronology towards older periods to constrain the timing and duration of the past climatic changes.

Marine sediment cores from the northern North Atlantic region exhibit millennial-scale variations with abrupt climatic shifts and bipolar seesaw, during glacial periods and terminations in various proxy records. By correlating the millennial-scale changes recorded in the marine sediment cores (e.g. in sea surface temperature and ice-rafted debris) with those in the Dome Fuji ice core (CH₄ concentration and d18O of ice), it may be possible to transfer the Dome Fuji chronology to the marine cores from the North Atlantic. We attempt to correlate planktonic δ¹⁸O and IRD records from marine core ODP 980 with the Dome Fuji CH₄ around MIS 11, and constrain the durations of interglacial periods recorded in the marine core. However, the current resolution of the Dome Fuji gas records (measured at ~2-kyr intervals) is not sufficient to undoubtedly identify all millennial-scale events, thus we are conducting new measurements to improve the resolution of the gas records. In the presentation, we will show the results of the new measurements and synchronization, and discuss the timing, duration and possible mechanisms for the very long interglacial period 400-kyr ago.

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