ダンスガードオシュガー振動と急激な気候変化のメカニズム
Simulated Dansgaard-Oeschger like oscillations and abrupt climate changes

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During the last termination of ice age cycle (deglaciation), Heinrich event 1 as well as B/A, Antarctic Cold Reversal (ACR) and Younger Dryas occurred as millennial scale climate changes. On the other hand, millennial scale climate changes such as D-O cycles recorded in ice core and deep sea cores in both hemisphere seem to occur more frequently during the mid-glacial state than during the early or late glacial state. Here we ran several sensitivity experiments and deglaciation simulations using a coupled atmosphere and ocean GCM (MIROC4m AOGCM) developed in Japan and analyzed the stability of AMOC and climate. Many model experiments were run for longer than10000 years under many different conditions of constant Greenhouse Gas levels, obliquity with/without glacial ice sheet and with and without freshwater flux into North Atlantic region. The results show large self-sustained oscillation of AMOC and high latitude temperature change similar to D-O cycles, which are consistent with ice core data and deep-sea data in both low and high latitude. Furthurmore, the results imply that both Northern Atlantic ocean-atmosphere-sea ice coupled system and Southern Ocean are important to maintain the oscillation with periodicity longer than 2000 years, for which we propose “Bipolar thermohaline oscillation” as its mechanism. We show that the D-O like oscillation occur with Glacial ice sheets under limited range of CO2, obliquity, and freshwater forcing. Implication on the mechanism and the conditions of the millennial scale climate changes for the past time period is discussed.

キーワード：気候、氷期サイクル、北大西洋子午面循環
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