

大気海洋結合モデルにより再現されたダンスガードオシュガー振動 DO-like oscillation under limited range of CO₂ and freshwater forcing simulated with MIROC AOGCM

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Millennial climate changes known as D-O cycles and AIM recorded in ice cores in both hemispheres occurred more frequently during the mid glacial state than during the early or late glacial state. Here we ran sensitivity experiments using a coupled atmosphere and ocean GCM (MIROC4m AOGCM) and analyze the stability of the AMOC and climate by running the model for several 1,000 years. Each experiment was run with specific greenhouse gas levels, ice sheet configuration and freshwater flux into the North Atlantic region. The conventional hysteresis curve related to the AMOC stability is also investigated by gradually changing the freshwater flux in the North Atlantic. The results show, for some cases, large oscillations in the AMOC and high latitude temperature similar to those suggested by the D-O cycles and reasonable bipolar warming/cooling signals including abrupt climate changes, consistent with ice core data and deep-sea data. We show that the D-O like oscillations occur under a limited range of CO₂ and fresh water forcing. Implications of these results on the mechanism of D-O cycles are discussed.

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