Modelling the stability of AMOC and climate under glacial and warm climate

ABE-OUCHI, AYAKO[123], YAMAMOTO, A[1], OHGAITO, R[2], CHAN, W-L[1], YOSHIMORI, M[4,1]., OKA, A[1]. S. SHERRIFF-TADANO[1], KAWAMURA, K[3]

[1]AORI, University of Tokyo, Tokyo, Japan, (abeouchi@aori.u-tokyo.ac.jp)
[2]JAMSTEC, Yokohama, Japan
[3]NIPR, Tokyo, Japan
[4]Hokkaido University, Sapporo, Japan

Millennial climate change such as D-O cycles and AIM recorded in ice cores in both Hemispheres is known to show a relatively higher amplitude in the middle-level of a glacial cycle than in the interglacial state or severe glacial state. Here we ran several sensitivity experiments using a coupled atmosphere and ocean GCM (MIROC4m, renamed from MIROC3.2.2) and show that the response to fresh water release to the ocean and bipolar response highly depend on the background climate. The experiments were conducted with 500 years water hosing of 0.05 to 0.1 Sv (where 1 Sv is equivalent to the water flux of 10m sea level rise in 100 years) in the North Atlantic 50-70N under different basic states; modern climate state with the pre-industrial condition, middle glacial climate state and full glacial condition, mainly differing in the ice sheet configuration and atmospheric amount of

Greenhouse Gases. The results under middle glacial condition show largest cooling/warming response in North Atlantic and a reasonable bipolar warming/cooling signal, which are consistent to ice core data and palaeoceanography data. We discuss the responses under different background climates and also compare them with the response to freshwater hosing under future warming climate.