L136-008 **Room: Function Room A** **Time: May 19 11:30-11:45**

Simulations of ocean carbon cycle based on the glacial climate fields of a full coupled atmosphere-ocean GCM

Megumi O. Chikamoto[1]; Ayako Abe-Ouchi[2]; Akira Oka[3]; Rumi Ohgaito[1]

[1] JAMSTEC; [2] CCSR, Univ. Tokyo; [3] Center for Climate System Research, The University of Tokyo

An ocean carbon cycle model is used to explore the response of ocean carbon cycle to glacial climate conditions. In the offline ocean carbon cycle model, the present and glacial fields derived from the CCSR/NIES/FRCGC coupled atmosphere-ocean general circulation model (MIROC) are prescribed. In this study, two types of glacial simulation were conducted. One is the glacial boundary condition presenting the deepening of the North Atlantic Deep Water (NADW) (LGMv1). The other is the condition of the shallower NADW and the Antarctic Bottom Water (AABW) extending further north (LGMv2). Since these cases have a different pattern of the Atlantic meridional overturning circulation, the experiments enable us to analyze the sensitivity of ocean carbon cycle to Atlantic overturning changes.

In the LGMv1 and LGMv2 experiments, the atmospheric CO_2 concentrations are lowered by 22 ppm and 17 ppm from the each present climate condition, respectively. In addition, we evaluate the contribution from changes in solubility, ocean circulation, sea ice concentration, and short-wave radiation at the sea surface to the atmospheric pCO_2 concentration. The main physical process explaining the lowered pCO_2 is the increasing solubility of CO_2 gas driven by the lowering sea surface temperature. The increased sea ice results in the increase in CO_2 concentration in the atmosphere. This is mainly because the extended sea ice covers the convection area in the North Atlantic where the CO_2 gas is removed from the atmosphere to the sea water and then reduces the solubility of CO_2 in sea water. The change in Atlantic meridional overturning circulation contributes to the pCO_2 rise in the LGMv1 case, while it is also similar response in the LGMv2 case. Our results imply relative insensitivity of atmospheric pCO_2 to Atlantic meridional circulation change.