The role of glacial meltwater in the both hemispheres on the Southern Ocean during the last deglaciation

*Takashi Obase[1], Ayako Abe-Ouchi[2,1]

1.Atmosphere and Ocean Research Institute, the University of Tokyo, 2.Japan Agency for Marine Science and Technology

Recent geological records suggest that West Antarctic Ice Sheet (WAIS) retreated and contributed to global sea level considerably during the Eemian Interglacial although WAIS survives during the deglaciation in the Holocene. Previous ice sheet modeling studies show that warmer seawater temperature around Antarctic ocean and higher rate of basal melting beneath ice shelves are essential to retreat WAIS (Pollard and Deconto 2009; Sutter et al., 2016). According to climate model experiments aiming Eemian interglacial climate, however, Antarctic Ocean is not so warm to account for higher basal melting of Antarctic Ice Shelves (Lunt et al., 2013; Otto-Bliesner et al., 2013). Recent climate modeling studies suggest that during interglacial, glacial meltwater release in the North Atlantic due to deglaciation of northern hemispheric ice sheets could weaken of thermohaline circulation and warms Southern Hemisphere (Holden et al., 2010), glacial meltwater from Antarctic Ice Sheet (Golledge et al., 2014) or North Atlantic (Dome F community members, submitted) could strengthen the stratification of Southern Ocean and warm seawater at subsurface to increase the rate of basal melting of Antarctic ice shelves. The impact of glacial meltwater on Southern Ocean and Antarctic ice sheet during deglaciations, however, is less investigated. In this study we perform freshwater hosing experiments using atmosphere-ocean coupled GCM. Realistic amount of freshwater perturbations are applied to the climate state of a deglaciation, and analyze the response and the evolution of atmospheric and oceanic fields in the Antarctic region.

Keywords: Antarctic Ice Sheet, Southern Ocean, interglacial, deglaciation, glacial meltwater

