Surface water freshening at the western Pacific warm pool during the LGM

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The western Pacific warm pool (WPWP) has the highest temperature in the world ocean. Because of its potential as a source of heat and moisture, the WPWP has played an important role of global climate change. Here, we present the deglacial history of the WPWP surface water by means of chemical analysis of planktonic foraminiferal shell.We used a 30 cm-long box core 3cBX which contains 25 kyr record. Eight foraminiferal species (G. ruber, G. sacculifer, G. conglobatus, N. dutertrei, G. aequilateralis, P. obliquiloculata, G. menardii, G. tumida) were picked from 1 cm slice of sediment and served to analysis of oxygen isotope and Mg/Ca.

The oxygen isotope results of two surface dwelling species, G. ruber and G. sacculifer, were almost similar for Holocene interval, while there was difference of 0.4 per mil between these species for LGM interval. On the other hand, the glacial-interglacial amplitudes of paleotemperature were approximately 2.7 degree C for both species. Taking these results at face value, the glacial-interglacial amplitude of the oxygen isotope of seawater were 0.4 and 0.9 per mil from results of G. ruber and G. sacculifer, respectively. These results were smaller than the oxygen isotope changes due to sea level change.

The sediment trap experiment result showed that habitat season of G. ruber and G. sacculifer are summer. The habitat depth of G. ruber is shallower than that of G. sacculifer. Therefore, the observed difference in two isotope results would reflect their habitat environment, namely surface and subsurface conditions. The published salinity reconstructions showed the surface freshening at the LGM. These results well agreed with our surface salinity reconstruction from G. ruber. The larger amplitude of subsurface salinity implied that the glacial freshening was limited to surface environment.