

High-resolution records of Uk'37- and TEX86L-based temperature off Tomakomai, Hokkaido for the last 3000 years

Michinobu Kuwae^{1*}, Masanobu Yamamoto², Takuya Sagawa¹

¹Senior Research Fellow Center, Ehime University, ²Faculty of Environmental Earth Science, Hokkaido University

For understanding the regional climate forcings, internal variability, system feedbacks, and the responses of surface climate and for comparing with regional-scale climate model simulations, importance of high resolution paleoclimate records for the past 2 millennia has been recognized in recent years. Because of lack of age controls and time resolution, many parts of the globe lack adequate paleoceanographic records in comparison with model simulations. In this study, we obtained high resolution records of UK'37- and TEX86L-derived temperature off Tomakomai, Hokkaido for the last 3000 years. From observations of sediment trap experiments, alkenone fluxes were higher from spring to fall and GDGT in early summer and winter in the western North Pacific. A mean value of TEX86L -derived temperature were 5.5 degree C lower than that derived from UK'37 and centennial-scale variations differed between the records. On the other hand, TEX86L-based temperature showed similar patterns of centennial variability in planktonic foraminiferal oxygen stable isotope ratio that reflected winter temperature in Off Shimokita Peninsula. This indicates our TEX86L-derived temperature may reflect climate signals primarily in winter in the western North Pacific. UK'37-derived temperature reconstructions demonstrated warm stage between 1000 BC and 300 BC, cooling trend between 300 BC and 100 AD, fluctuating between 100 AD and 600 AD, warm stage between 600 AD and 1300 AD, and cold stage between 1300 and 1700 AD. These multicentennial variations showed similar patterns to those in UK'37-derived temperature from temperate regions around Japan including off Sanriku (Minoshima et al., 2007), off Joban (Isono et al., 2009), and Beppu Bay (Yamamoto unpublished), indicating that the observed multicentennial variations are associated with climate dynamics controlling summer SST in the temperate and subarctic regions of the western North Pacific.

Keywords: Uk'37, TEX86, paleotemperature, late Holocene, western North Pacific