Evolution of upper water column structure inferred from paired alkenone and tetraether lipid proxies in the central Japan/East Sea since 25 ka BP

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We measure and analyse the alkenone and tetraether lipid records over the past 25 ka, from a sediment core recovered from the central Japan/East Sea. In our results, U37K′- and TEX86- derived temperatures commonly represent warm signals during the period of 25-16.2 ka BP, indicating fresher and thus a stratified surface ocean. In comparison, the U37K′- and TEX86- derived temperatures become diverged abruptly after 16.2 ka BP, suggesting a thermal gradient between surface and subsurface water. In addition, the isoprenoidal glycerol dialkyl glycerol tetraethers (GDGT) community structure index, GDGT-[2]/[3] ratio is high during the period of 25-16.2 ka BP and drops sharply along with the TEX86- derived temperatures at 16.2 ka BP, which is likely attributed to changes in the depth of GDGT export and/or in archaeal community structure. Specifically, the high GDGT-[2]/[3] ratio (larger than 8) can be related to strongly stratified surface Japan/East Sea. Moreover, the U37K′- and TEX86- derived temperatures start converging at 5.8 ka BP, representing the impact of the Tsushima Warm Current until nowadays. Note: This study was supported by the National Natural Science Foundation of China (Grants No. 41420104005, U1606401) and National Program on Global Change and Air-Sea Interaction (GASI-GEOGE-03 &-04).