



Holocene variability in sea surface temperature from the southeast Yellow Sea

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Holocene temperature changes exhibit strong regional pattern. So far, variation in Holocene temperature of East Asia still remain poorly understood due to limited records. This study reconstructed new high-resolution variations in sea surface temperature (SST) during the Holocene by using the alkenone unsaturation index of marine sediments of two deep drilled cores recovered from Heuksan mud belt (HMB) which is located in the southeast Yellow Sea. The study area is characterized by high sedimentation rate of approximately 0.2 cm/yr and average temporal resolution of the reconstructed alkenone temperature record is approximately 10-20 yr. Alkenone-based temperatures of 84 different surface sediments from the HMB indicates that the reconstructed alkenone temperature from the HMB marine sediments represents the averaged SST in April to October. In addition to seasonality, there are several factors influencing the SST of this site (water depth, approximately 50-60 m) including air temperature, tidal mixing and current. Investigation of instrumental data for the period of 1998-2018 shows that, among the factors, the SST of the site is closely related to the air temperature. Our results of alkenone analysis of deep drilled sediments show that there were two long pronounced cold periods at 3-5 ka and 6.6-8.4 ka BP during the Holocene. These cold periods were also observed at other regions (e.g. Tibetan Plateau, lower Yangtze region) in mid-latitude of East Asia, indicating that the cooling pattern was regional pattern. This pattern contrasts with the trend of global Holocene temperature which was characterized by warm early Holocene and gradually cooling through the middle to late Holocene.