Attempt on the reconstruction of seasonal hydroclimate changes in Bohai Bay using stable isotopes of bivalve shells

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The temperature and chemistry of the seawater in the geological past, which could reflect global climate evolution and regional hydroclimate changes, takes an important role in the paleoclimate studies. Marine bivalve shell is an ideal high-resolution archive of the past ocean. However, temperature and salinity signals extracted from the shell chemistry are often affected by each other or by other factors, for example, the Sr/Ca and Mg/Ca thermometry of bivalve shell are affected by salinity and kinetic effects, and the application of oxygen isotope thermometry is limited for the difficulty in constraining the influence of the isotopic composition of ancient seawater and its seasonal variation, especially in the coastal and estuarine regions.

Here we present high resolution carbon and oxygen isotope records from modern shells of *Crassostrea gigas* (pacific oyster) collected from Bohai Bay, the drainage of more than fifteen rivers. Shell carbonates for stable isotope analysis were microdrilled from the ligamental growth area. The monthly resolved $\delta^{18}O$ of shell carbonate shows very clear annual cycles, co-varied with local seawater temperature variation. However, the ranges of $\delta^{18}O$ seasonal extremes were larger than those predicted by the oxygen isotope thermometry assuming no changes in seawater $\delta^{18}O$ ($\delta^{18}O_w$), showing the influence from seasonal changes in river runoff and precipitation. To disentangle the temperature and $\delta^{18}O_w$ signals we will then apply the clumped isotope thermometry to calibrate the shell carbonate Δ_{47} against the calcification temperature, and constrain the temperature and $\delta^{18}O_w$ changes with temporal resolution lower than the shell $\delta^{18}O$. This study will shed new light on the reconstruction of short-scale temperature and hydroclimate oscillation and the seasonality in the geological past.