Clumped isotope thermometry on seasonal growth band of fossil shell revealed occurrences of winter time storm at the dawn of Cenozoic Era

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Isotopic signature in the mollusc shell growth bands revealed seasonal temperature and oxygen isotopic composition. These samples originated from late cretaceous and modern estuarine settings. Modern shell, of species *Villorita Cypronides* was collected from the back water of Cochin Estuary. Whereas well preserved fossil shell of oyster was recovered from the Kallankuruchi Formation of Ariyalur region of Cauvery basin. Clumped isotopic composition allowed determination of water temperatures at seasonal time scale while conventional stable isotope was used for deducing the water isotopic composition. We identified warm and cold period and estimated the freshwater discharge using oscillating isotopic ratios in the growth band. Our measurement showed seasonal temperature ranging between 20 to 32°C obtained from the modern samples. We extended the thermometry to understand the seasonal temperature range of 37 to 44°C during Late Cretaceous and also determined the fresh water fluxes at seasonal time scales. Our observation showed winter time high supply of fresh water in the region and minimal precipitation during dry summer time with minimal precipitation. The observation is firsts of its kind where we documented effect of storm events in the growth bands which is consistent with the sedimentary record documented from the region.