

Temperature and environmental reconstruction for early Burdigalian using carbonate ‘clumped isotope’ paleothermometer on fish otoliths

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Ghosh et al. (2007) initially published fish otoliths calibration data based on heated gas referencing. Here we used the previous published data into absolute reference frame for clumped isotope measurements based on heated gas and NBS19 (Dennis et al., 2011, Eagle et al., 2013). Our revised calibration equation: $\Delta 47 = 0.055(\pm 0.006) (106/T2) + 0.07(\pm 0.074)$ is slightly more sensitive to temperature than earlier equation. We used the approach to validate the temperature and environmental water composition of Arabian Sea using Tuna (*Thunnus albacares*), and Bay of Bengal using Big eye snapper (*Lutjanus lutjanus*) otolith's. The estimated average oxygen isotope in surface water was comparable with the average value of $-0.3 \pm 0.4\%$ reported from the coastal water of the region. The technique was further extended to study the bottom water temperature from well preserved otolith's of *Ambasidarum sp* and *Gobiidarum sp* from sediments of Quilon basin of India deposited during Miocene time. The technique was employed to estimate the average bottom water temperature to be 22°C and 11°C, which is representative of very shallow near shore habitats, during Miocene.

Ref

Ghosh et al, Geochimica et Cosmochimica Acta, 71, 11, 2007.

Dennis et al., Geochimica et Cosmochimica Acta, 75, 22, 2011.

Eagle et al., Biogeosciences, 10, 4591–4606, 2013