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Re-visiting the *Globigerinoides ruber* $\delta^{18}\text{O}$ salinity temperature relationship in the Indian Ocean

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The application of $\delta^{18}\text{O}$ Oruber to reconstruct past hydrological changes requires precise understanding of the relationship between seawater temperature, salinity, pH, carbonate ion concentration and $\delta^{18}\text{O}$ Oruber. Here we assess the $\delta^{18}\text{O}$ Oruber-seawater salinity-temperature relationship and effect of diagenesis on this relationship in the northern Indian Ocean based on core-top samples. The samples were collected from two salinity end member regions in the path of seasonal coastal currents, in the northern Indian Ocean. The $\delta^{18}\text{O}$ Oruber analyzed as part of this work were augmented with previous core-top $\delta^{18}\text{O}$ measurements in the northern Indian Ocean. A total of ~325 surface sediment data points (97 from this work and 228 from previous work) are used to understand factors that affect $\delta^{18}\text{O}$ Oruber in the Indian Ocean. In order to understand the diagenetic effect, the core-top $\delta^{18}\text{O}$ Oruber values were also compared with the previously published plankton tow $\delta^{18}\text{O}$ Oruber values from the Indian Ocean (Duplessy et al., 1981; Kroon and Ganssen, 1989; Ganssen and Kroon, 1991; Peeters et al., 2002), as well as the expected $\delta^{18}\text{O}$ calculated from the modern seawater parameters (SST, SSS, $\delta^{18}\text{O}$ Osw). We report that salinity exerts the major control on $\delta^{18}\text{O}$ Oruber ($R = 0.85$), than temperature ($R = 0.53$). The $\delta^{18}\text{O}$ Osw estimated from the core-top $\delta^{18}\text{O}$ Oruber suggests 0.24‰ change per salinity unit which is close to previous reports but different than 0.17‰ increase in $\delta^{18}\text{O}$ Osw per unit increase in salinity as estimated from ambient seawater parameters. The relationship between temperature and $\delta^{18}\text{O}$ Oruber - $\delta^{18}\text{O}$ Osw in the northern Indian Ocean [$T = -1.23(\delta^{18}\text{O}\text{Oruber} - \delta^{18}\text{O}\text{Osw}) + 24.36$] is different than reported by Mulitza et al (2003) based on the global compilation of plankton tow $\delta^{18}\text{O}$ Oruber data. A distinct difference is observed in core-top and plankton tow $\delta^{18}\text{O}$ Oruber-salinity-temperature relationship, suggesting differential diagenetic alteration of $\delta^{18}\text{O}$ Oruber.

