# Climate change led to the demise of 5000-year old Harrapan settlement at Dholavira: isotopic evidence from gastropod *Terebralia palustris*

TORSA SENGUPTA[1*]

[1]Department of Geology and Geophysics, Indian Institute of Technology, Kharagpur 721302, India (*correspondance: torsasengupta13@gmail.com )

Remains of an ancient settlement at Dholavira located in the Rann of Kutch, Gujarat represent the evolution of a Harappan metropolis from the Early to Late cultural phases of the Indus Valley Civilization (IVC 5.2-3.9 ky BP) [1]. The hospitable climate that supported the IVC contrasts sharply with the present inhabitable landscape of the Rann. Stable isotopic studies of the carbonate phase of the estuarine gastropod shells *Terebralia palustris*, found in the recent mangrove sediments as well as the Dholavira ruins, show that they record ambient water composition and temperature [1]. A few of these gastropod shells from the Dholavira site was used to reconstruct the ambient hydrological regime and its seasonality during the Early to Post Harappan times. The highly negative $\delta^{18}O$ values of a 4.7 ky old *T. palustris* ($\delta^{18}O_{shell}$ ~ -5.8 ‰) suggest the presence of a glacial-fed river having $\delta^{18}O_{water}$ value of about -12 ‰ (ancient Indus distributary/Saraswati?) [1]. In contrast, the $\delta^{18}O$ value of a 4.3 ky old *T. palustris* ($\delta^{18}O_{shell}$ ~ -1.9 ‰), is similar to the values seen in modern-day shells ($\delta^{18}O_{shell}$ ~ -1.5 ‰). This indicates drying up of this ancient river at the onset of the global Meghalayan stage drought (4.3-4.1 ky BP) [1, 2]. An abrupt desertion of the Dholavira settlement about this time, (between Stage-V and VI) is also corroborated by archaeological evidence [1]. The $\delta^{18}O$ values of yet another Dholaviran *T. palustris* ($\delta^{18}O_{shell}$ ~ -2.8 ‰) suggest a return to a comparatively wetter regime near the lower boundary of the Meghalayan stage drought (~ 4.0 ky BP).

[1] Sengupta et al. (2019) JQS **DOI: 10.1002/jqs.3178**. [2] Walker et al. (2019) JQS **34,** 173-186.