

Testing the connectivity history of the Black Sea and the Caspian Sea during the Pleistocene, using strontium isotopes

Diksha Bista^{1,2*}, Rachel Flecker¹, David Richards^{1,2}

¹School of Geographical Sciences, University of Bristol, Bristol, BS8 1SS UK (*corrospondence: diksha.bista@bristol.ac.uk)

²Bristol Isotope Group, University of Bristol, Bristol BS8 1RJ (r.flecker@bristol.ac.uk , david.richards@bristol.ac.uk)

Strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) in marginal marine and lacustrine systems are a function of the balance between the freshwater and oceanic input to the basin. This ratio is captured and preserved by organisms that precipitate low Mg-calcite shells. Here we apply this approach to the last 2.5 million years of Caspian and Black sea history. This is an excellent location to test this method because of the highly divergent strontium isotopic ratios of the different rivers and the evolving connectivity and isolation between the two basins and the global ocean.

Identification of faunal biodiversity in the geological record has been used to reconstruct connectivity and isolation between these three marine systems. We use strontium isotopes analysis to provide an independent test of this connectivity history. $^{87}\text{Sr}/^{86}\text{Sr}$ was measured on fossil ostracods, micro-crustaceans with calcitic exoskeleton, obtained from the Pleistocene sediment of the Black and the Caspian seas to investigate the coeval water geochemistry of the two basins over the last 2.5 Ma. Water samples from the Black Sea, the Caspian Sea, and various rivers draining into them were also measured for $^{87}\text{Sr}/^{86}\text{Sr}$ to examine the present day strontium isotopic signal across the region. Faunal data suggests two periods of connectivity with an intermediate period of isolation between these two basins between 1-2.5 Ma. The combined strontium isotopic ratio of these basins broadly supports the paleontological data but provides more details in terms of timing and nature of the connectivity between the basins.