Geochemical analyses of fossil shells of *Gafrarium tumidum* collected from Tongatapu Island and its application for paleoceanography and archaeology during the Holocene

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Skeletal calcium carbonate can be analysed with geochemical techniques to investigate climate and the environment in the past. In this study, we examined bivalves of *Gafrarium tumidum* excavated from Holocene archaeological sites on Tongatapu Island, in the Kingdom of Tonga (21°10'S, 175°10'W) to reconstruct the palaleoclimate and to determine whether climate events may have affected prehistoric migration. Tonga, in West Polynesia, was settled 2850 years ago and was a source area for the peopling of East Polynesia around 1000 years ago. The Polynesian expansion represents the most extensive maritime migration in world prehistory. Tongatapu is under the influence of South Pacific Convergence Zone (SPCZ), and while a detailed understanding of this atmospheric configuration is lacking, variation in the SPCZ may have affected Polyensian dispersal as canoe voyaging was dependent, largely, on wind patterns. To examine the shells, we employed laser ablation IRMS (isotope ration mass spectrometry) and LA-HR-ICPMS (laser ablation high resolution inductively coupled plasma mass spectrometry) to measure oxygen isotopic composition ($\delta^{18}O$) and trace element/Ca ratio (e.g., Sr/Ca, Mg/Ca, and Ba/Ca) of the shells along the maximum growth axis. To understand the physical property of ambient water where the shells lived, we calculated a local marine ^{14}C reservoir age (ΔR). We discuss the results of Tongatapu Island paleoenvironmental reconstruction based on bivalve geochemistry that could be related to regional and global climate changes.