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Ocean Acidification in the Western Pacific: Boron Isotopic Records in Coral Skeleton

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Boron isotopic composition (δ11B) of biogenic carbonates is a useful proxy for estimating oceanic paleo- pH. In this study, long-lived massive coral skeletons (Porites lobata) collected from Lan-Yu Island offshore southeastern Taiwan were used to measure δ11B. We found a clear temporal trend in ΔMg/Ca-SST of approximately +0.2 ˚C yr-1 and a slight decrease of 0.16‰ in δ11B during the study period, corresponding to a pH change of -0.02, if the severe El Niño during 1991 was excluded. We measured annual δ11B variation less than 2‰ (range 23.6 to 25.1‰, corresponding to a pH change of about 0.2, in agreement with results from Flinders Reef in the Coral Sea. In combination with Mg/Ca-based thermometry, the intra-annual pH record derived from δ11B showed a seasonal cycle with high pH during the winter period, consistent with modern seawater pCO_2 observations in the western Pacific. These new results indicate that coralline δ11B in the Lan-Yu Island accurately record oceanic pH, which can contribute to our understanding the relationships between climate change and potential biological responses in the western Pacific.