Is Acropora Cervicornis A Canary in The Global Warming Coal Mine? Lessons From The Mid-Holocene Dominican Republic

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The recent, well-documented decline of *Acropora cervicornis* throughout the wider Caribbean region has been cause for considerable alarm, with the decline interpreted as a warning of greater coral reef devastation in the future. Elevated sea-surface temperatures, white band disease, anthropogenic stress, and storm activity have all been cited as potential causes for the decline. In order to understand the optimal conditions and threshold environmental range for *A. cervicornis* growth, an extensive mid-Holocene fringing reef located in the Dominican Republic was examined for evidence of paleoenvironmental variability during *A. cervicornis* dominance over a >3000 year period. Over 50 radiocarbon and $^{234}U/^{230}Th$ dates from an 11 m vertical exposure of *A. cervicornis* indicate continual accumulation between ~9.5 to ~7.3 ka with only minor reversals (mixing events). The species continued to thrive at the site until at least ~5.8 ka. This time range was marked by increasing regional sea-surface temperature to a mid-Holocene thermal maximum (HTM), a time comparable to, if not warmer than, present. $\delta^{13}C$ and $\delta^{18}O$ data from the fossil *A. cervicornis* specimens indicate high-magnitude changes in precipitation during reef formation with no resulting break in coral accumulation. Taphonomy and morphology data suggest the species thrived under high sediment stress, variable bioerosion, and differential exposure to wave activity. High-resolution $\delta^{13}C$ and $\delta^{18}O$ data from modern *A. cervicornis* growing at comparable depths off Barbados (2007 collections) show stable isotope 'signatures' most similar to corals that grew at the height of the HTM. *A. cervicornis* from the Dominican Holocene can be characterized as a relatively hardy survivor during highly variable environmental conditions. The data and inferences derived from this study indicate that the cause for recent *A. cervicornis* decline is not strictly due to rising sea surface temperature.