



Intensification of the meridional temperature gradient in the Great Barrier Reef following the Last Glacial Maximum - Results from IODP Expedition 325

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Tropical south-western Pacific temperatures are of vital importance to the Great Barrier Reef (GBR), but the role of sea surface temperatures (SSTs) in the growth of the GBR since the Last Glacial Maximum remains largely unknown. Here we present records of Sr/Ca and $\delta^{18}\text{O}$ for Last Glacial Maximum and deglacial corals that were drilled by Integrated Ocean Drilling Program (IODP) Expedition 325 along the shelf edge seaward of the modern GBR. The Sr/Ca and $\delta^{18}\text{O}$ records of the precisely U-Th dated fossil shallow-water corals show a considerably steeper meridional SST gradient than the present day in the central GBR. We find a 1–2 °C larger temperature decrease between 17°S and 20°S about 20,000 to 13,000 years ago. The result is best explained by the northward expansion of cooler subtropical waters due to a weakening of the South Pacific gyre and East Australian Current. Our findings indicate that the GBR experienced substantial and regionally differing temperature change during the last deglaciation, much larger temperature changes than previously recognized. Furthermore, our findings suggest a northward contraction of the Western Pacific Warm Pool during the LGM and last deglaciation, and serve to explain anomalous drying of northeastern Australia at that time. Overall, the GBR developed through significant SST change and, considering temperature alone, may be more resilient than previously thought.

Webster, J. M., Yokoyama, Y. & Cotteril, C. & the Expedition 325 Scientists. *Proceedings of the Integrated Ocean Drilling Program* Vol. 325 (Integrated Ocean Drilling Program Management International Inc., 2011).

Felis, T., McGregor, H. V., Linsley, B. K., Tudhope, A. W., Gagan, M. K., Suzuki, A., Inoue, M., Thomas, A. L., Esat, T. M., Thompson, W. G., Tiwari, M., Potts, D. C., Mudelsee, M., Yokoyama, Y., Webster, J. M. Intensification of the meridional temperature gradient in the Great Barrier Reef following the Last Glacial Maximum. *Nature Communications* 5, 4102, doi:10.1038/ncomms5102 (2014).