

Shallow-water corals as high-resolution archives of climate change

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Fig. 1. Underwater sampling of massive *Diploria strigosa* coral, Venezuela

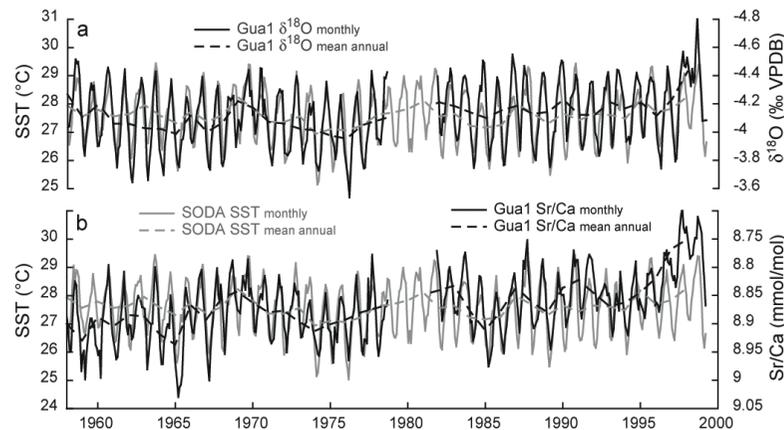


Fig. 2. Calibration of monthly coral (a) oxygen isotope data and (b) Sr/Ca elemental ratios (solid black lines) with instrumental SST (solid gray line)

Fig. 3. X-radiography of 86-year *Diploria* sp. coral core (1918-2004), displaying annual density banding

The role of the oceans in climate change is still poorly understood. In order to explore the ocean's variability on decadal to centennial time scales it is vital to develop high-resolution marine archives.

Geochemical signatures measured in corals provide seasonal records of past environmental change. Massive shallow-water coral colonies can grow for several hundred years, extending beyond instrument-derived measurements.

The tropics feature some of the most important climate phenomena on the globe and play a key role in oceanic and atmospheric variability. The tropical North Atlantic is a key region to study Northern Hemisphere climate variability.

We focus on:

- the development of paleoclimate records from coral skeletons
- the quantitative reconstruction of water temperature and salinity by analyzing monthly coral $\delta^{18}\text{O}$ and Sr/Ca ratios
- the reconstruction of large-scale signals of past climate variability and the influence of external forcing on tropical Atlantic climate
- the impact of SST on rainfall in the tropical warm pools
- the development of master chronologies of proxy records

Publications:

Hetzinger, S., Pfeiffer, M., Dullo, W.-Chr., Ruprecht, E., and Garbe-Schönberg, D., 2006, Sr/Ca and $\delta^{18}\text{O}$ in a fast-growing *Diploria strigosa* coral: Evaluation of a new climate archive for the tropical Atlantic, *Geochemistry Geophysics Geosystems*, v. 7(10), doi:10.1029/2006GC001347.

Hetzinger, S., Pfeiffer, M., Dullo, W.-Chr., Keenlyside, N., Latif, M., and Zinke, J., 2008, Caribbean coral tracks Atlantic Multidecadal Oscillation and past hurricane activity, *Geology*, v. 36, no. 1, p. 11-14, doi: 10.1130/G24321A.1

Hetzinger, S., Pfeiffer, M., Dullo, W.-Chr., Garbe-Schönberg, D., Halfar, J., 2010, Rapid 20th century warming in the Caribbean and impact of remote forcing on climate in the northern tropical Atlantic as recorded in a Guadeloupe coral, *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 296(1-2), pp. 111-124.