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# A 350 Year Cloud Cover Reconstruction Deduced from Caribbean Coral Proxies

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Clouds are a major factor contributing to climate change with respect to a variety of effects on the earth's climates, primarily radiative effects, amelioration of heating, and regional changes in precipitation patterns. There have been very few studies of decadal and longer term changes in cloud cover in the tropics and sub-tropics, both over land and the ocean. In the tropics, there is great uncertainty regarding how global warming will affect cloud cover. Observational satellite data is so short that it is difficult to discern any temporal trends.

The skeletons of scleractinian corals are considered to contain among the best records of high-resolution (sub-annual) environmental variability in the tropical and sub-tropical oceans. Corals generally live in well-mixed coastal regions and can often record environmental conditions of large areas of the upper ocean. This is particularly the case at low latitudes. Scleractinian corals are sessile, epibenthic fauna, and the type of environmental information recorded at the location where the coral has been living is dependent upon the species of coral considered and proxy index of interest.

Zooxanthellate hermatypic corals in tropical and sub-tropical seas precipitate $CaCO_3$ skeletons as they grow. This growth is made possible through the manufacture of $CaCO_3$ crystals, facilitated by the zooxanthellae. During the process of crystallization, the holobiont binds carbon of different isotopes into the crystals. Stable carbon isotope concentrations vary with a variety of environmental conditions. In the Caribbean, $\delta$13C in corals of the species Montastraea faveolata can be used as a proxy for changes in cloud cover. In this contribution, we will demonstrate that the stable isotope 13C varies concomitantly with cloud cover and present a new reconstruction of cloud cover over the Caribbean Sea that extends back to the year 1760. We will show that there is good agreement between the main features of our coral proxy record of cloud cover and of reanalysis and climate simulations for the same time period.