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Project 1. “Assessing variability in the heat transport of the tropical N. Atlantic using radiocarbon records from corals and sclerosponges” – NSF-OCE

Description: In the North Atlantic Ocean, poleward transport of equatorial heat is facilitated by both the Atlantic Meridional Overturning Circulation and the Subtropical Cells (STCs). Changes in the transport balance of these two mechanisms have been suggested by the short instrumental record of oceanographic data, but questions about whether these changes reflect cycles or trends in the climate system remain unaddressed by the short length of these records. This research analyzes radiocarbon (^{14}C) records stored in the skeletons of corals and sclerosponges from a variety of locations across the tropical Atlantic to constrain changes in the STCs over the past century and beyond. The locations from which these skeletal archives have been taken enable a unique opportunity for geochemical paleoceanographic data, rich in temporal extent but spatially sparse, to aid in the interpretation of the short instrumental record. Results from this study will be of interest not only to paleo-oceanographers and paleoclimatologists, but also to climate modelers who may aim to use numeric simulations to spatially interpolate the records resulting from this project.

Objectives:

During the ten week period, participants will:

- gain experience with techniques of isotope ratio mass spectrometry
- learn principles of climate change and pre-historical variability in climate
- develop an understanding of the oceans' roles in controlling climate
- travel to Woods Hole Oceanographic Institution to gain experience in radiocarbon (^{14}C) determination
- organize a data set, complete necessary calculations, formulate interpretations, and present findings orally and in writing.

Pre-requisites:

Completion of sophomore year, 3.00 GPA (or higher), introductory chemistry laboratory and lecture, one course in one of the following areas: oceanography, geology, climate change, atmospheric science.