

# USGS NSF Internship Opportunity

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● <b>USGS Center:</b>	St. Petersburg Coastal and Marine Science Center
● <b>Project Title:</b>	Reconstructing millennial-scale hydrologic variability of nearshore environments of south Florida during the Holocene
● <b>Summary:</b>	<p>This internship will provide an opportunity to use the USGS's extensive coral-reef core archive and geochemical laboratory facilities to develop novel paleoclimate and paleoceanographic reconstructions of coral-reef habitats in south Florida. This cutting-edge research will be potentially transformative to our understanding of the millennial-scale evolution of the environments of south Florida and its controls on coral-reef development past, present, and future.</p>
● <b>Project Hypothesis or Objectives:</b>	<p>A recent work by USGS researchers at the St. Petersburg Coastal and Marine Science center suggests that the nearshore environments of south Florida experienced significant hydrographic variability during the middle-to-late Holocene (~7000 years ago to present) as a result of changes in regional oceanographic circulation, groundwater influx, and/or terrestrial runoff. During this same period, the growth of Florida's coral-reef ecosystems began to decline and, by 3000 years ago active reef growth ceased throughout the region. The purpose of this study is to use coral-reef cores from the Florida Keys reef tract to develop and apply new geochemical techniques (for example, clumped isotope paleothermometers) aimed at reconstructing temperature and salinity changes in south Florida during the Holocene. This research has broad implications for understanding the natural evolution of the environments of south Florida and its impacts on both marine and terrestrial ecosystems. Furthermore, understanding the drivers of past hydrographic variability may provide information that can be used to predict how the environments of south Florida will respond to changes in temperature and hydroclimate in the future.</p> <p>The intern will utilize the extensive archive of coral-reef cores from throughout the Florida Keys reefs tract develop new geochemical</p>

proxies for paleoceanographic variability in south Florida. The intern will also have the opportunity to use the geochemistry laboratory facilities at USGS's St. Petersburg Coastal and Marine Science Center (<https://coastal.er.usgs.gov/crest/research-themes/climate.html>) to process and analyze sub-fossil coral samples to develop Sr/Ca-based temperature reconstructions for the region. The multi-proxy approach used in this study will provide robust reconstructions of the environmental variability that characterized the nearshore environments of south Florida over the last 10,000 years.

- Duration:** Up to 12 months
- Internship Location:** St. Petersburg, FL
- Keywords:** Climate Change, Coasts, Ecology, Ecosystems, Geochemistry, Geology, Hydrology, Hydrology, ground water, Hydrology, surface water, Paleoclimatology, Statistics
- Applicable NSF Division:** GEO (Atmospheric, Earth Sciences, Ocean Sciences, Polar Programs)
- Intern Type Preference:** NSF-Funded MS or PhD student via the Non Academic Research Internships for Graduate Students program (INTERN)
- Duties/Responsibilities:** This program will provide the intern with the opportunity to gain laboratory and analytical skills using state-of-the-art equipment and facilities and the expertise available in the USGS geochemistry laboratory at the St. Petersburg Coastal and Marine Science Center. This research will provide the opportunity to expand the center's existing capability of reconstructing coral-reef environments (<https://coastal.er.usgs.gov/crest/research-themes/climate.html>) to include novel geochemical techniques like clumped isotopes. The intern will be responsible collecting, processing, and analyzing geochemical records from coral skeletons in the USGS Core Archive. Specifically, by working with USGS scientists, the intern will gain expertise in coral microdrilling, sample preparation for geochemical analysis, and trace-element geochemical analysis of marine carbonate's using the inductively-coupled plasma optical emissions spectrometer (ICP-OES). The intern will collaborate with USGS scientists to combine the datasets they collect into a millennial-scale reconstruction of temperature and salinity change in the nearshore environments of south Florida. All data collected during this project will be made publically available to scientists and research managers through a USGS Data Release and the intern will work with USGS researchers to develop at least one peer-reviewed publication.
- Expected Outcome:** This research is well-aligned with the goals of the Coral Reef Ecosystem Studies project (<https://coastal.er.usgs.gov/crest/>) of the USGS Coastal and Marine Geology program and the USGS Land Use Change program ([https://www2.usgs.gov/climate\\_landuse/clu\\_rd/scitopics.asp#cc](https://www2.usgs.gov/climate_landuse/clu_rd/scitopics.asp#cc)). The research that will be conducted through this internship will

support ongoing USGS research into the oceanographic and environmental history of south Florida. The improved understanding and information resulting from the environmental reconstructions developed during this internship will help to constrain the magnitude and drivers of natural hydrographic variability in south Florida, which could serve as a baseline for evaluating the potential impacts of future environmental change.

The intern will use laboratory and analytical skills related to the development of paleoclimate and paleoceanographic reconstructions through geochemical analysis of coral samples. The intern will also gain valuable professional experience in a federal setting, and USGS will gain scientific information that will help inform resource managers about natural environmental variability in south Florida. This collaborative research will result in at least one peer-reviewed publication, a USGS Data Release, and at least one presentation at a scientific meeting.

● **Special skills/training  
Required:**

The intern must have the following skills and training:

Background in environmental reconstructions from marine environments

Experience in processing carbonates for geochemical reconstructions

Strong analytical skills and proficiency in statistical analysis

Experience in a laboratory setting

Strong interpersonal skills

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