USGS NSF Internship Opportunity

🟠	**Point of Contact Name**:	Lynn Wingard
🟤	**Point of Contact Email:**	lwingard@usgs.gov
🔵	**USGS Center:**	Eastern Geology and Paleoclimate Science Center, Greater Everglades Priority Ecosystems Science Program
🟣	**Project Title:**	Linking Irma storm signatures to the Holocene sediment record for South Florida
🟢	**Summary:**	South Florida's proximity to sea level makes Miami and the Everglades ecosystem vulnerable to storm surge. Sediment cores document past rates of sea level rise, but past storm signatures are difficult to identify. Development of modern calibration datasets will provide information to interpret past storm records and help urban planners and resource managers prepare for the future.
🟣	**Project Hypothesis or Objectives:**	The objective of this proposal is to develop a modern calibration dataset using multiple biological (pollen, plant macrofossils, mollusks), geochemical (elemental and isotopic), and physical (grain size) proxies for storm deposition using surficial material collected from four islands in Florida Bay, Everglades National Park, following the passage of hurricane Irma in October 2017. The USGS cored four islands in 2014, which have been analyzed for changes in Holocene sea level and island formation processes. The record of storm history, however, has been more difficult to identify in the cores, but the recent passage of hurricane Irma provides the opportunity to collect samples from deposits made by a storm of known intensity, duration, and direction. Using the modern samples we collect, we plan to generate a modern calibration dataset of storm deposits and other depositional environments to apply to the Holocene-aged cores collected in 2014.

The urban population of Miami and the internationally protected Everglades ecosystem are within a few meters of elevation above sea level, making the area vulnerable to storm surge associated with tropical storms. This problem will increase with the rise in sea level predicted throughout the 21st century and estimates of changes in storm frequency and intensity for the 21st century vary. Urban planners and resource managers need to understand centennial- to |

millennial-scale patterns of climate change and sea level rise documented in sediment cores. Interpretation of past storm signatures, which may vary across islands, will be significantly improved with the development of modern calibration datasets. The results will assist decision-makers by providing a better understanding of past storm frequency over the late Holocene and the impacts to these islands, which protect the mainland from storm surge.

Duration: Up to 12 months

Internship Location: Reston, VA

Field(s) of Study: Geoscience, Life Science

Applicable NSF Division: AGS Atmospheric and Geospace Sciences, EAR Earth Sciences, OCE Ocean Sciences

Intern Type Preference: Any Type of Intern

Keywords: Storm history, geochemical proxies, biological proxies, south Florida, Holocene, calibration datasets, sea level rise

Expected Outcome: At the conclusion of this project we will have a calibration data set that identifies key sedimentological, chemical, biochemical, and/or biological proxies for storm deposits that can be applied to existing and future cores from Florida Bay. The intern will benefit from gaining laboratory and practical experience in the development and application of calibration data sets to sediment core analyses. Also, the intern will have the opportunity to work with a diverse team of scientists in providing information to resource managers and urban planners in South Florida, a region that is vulnerable to anticipated 21st century changes in sea level and climate. The USGS will benefit from the development of a calibration data set that can be expanded and applied to the analysis of cores from other coastal areas in the southeastern United States.

Special skills/training Required: The intern should have lab experience in preparing samples for elemental and isotopic analysis, and experience processing sediment cores. Knowledge of a variety of multivariate statistical techniques and statistical packages is required. Knowledge of XRF/XRD analyses and SEM operation is preferred; also, a working knowledge and familiarity with grain size analyses. The preferred candidate will have experience in developing proxy data for paleoclimate, sea level, or ecosystem history applications.

Duties/Responsibilities: The intern will have the opportunity to work with a team of paleoclimate and ecosystem history scientists working on Everglades Ecosystem Restoration and addressing urban and resource planning

needs of south Florida. Depending on the time frame for the start of the internship, the student may have the opportunity to accompany the team in the field to collect the post-Irma samples to use in the calibration studies. The intern will be responsible for developing the modern calibration data set from multiple biological (pollen, plant macros, mollusks), geochemical (elemental and isotopic analyses), and physical (grain size) proxies, and will be given the opportunity to explore potential new proxies for development. Work will be conducted in USGS laboratories and with USGS lab staff. There will also be opportunities to work with colleagues at other institutions in collaborative arrangements to use equipment that we do not have in Reston. The intern will utilize appropriate multivariate statistical techniques to identify relationships among the proxies, and if time allows, apply the proxies to the interpretations of one or more of the 2014 cores.

Center Director Name: Christopher Bernhardt
USGS Responsibilities: Equipment, Facilities, Mentoring, On-boarding, Background Check, Volunteer Agreement Management
Preliminary Approval: This opportunity has my Center's approval
I already have a student in mind:

Comments: This proposal is part of ongoing USGS research under the Greater Everglades Priority Ecosystems Science Program. Project members are part of Everglades restoration teams and results are communicated directly to resource managers (agencies include National Park Service, US Fish & Wildlife Service, Army Corps of Engineers, NOAA, South Florida Water Management District, and others). Results from related projects are being used to set performance measures and targets for Everglades restoration. As part of this research team, the intern will have the opportunity to participate in restoration planning meetings and develop an understanding of how science can be expediently applied to societal problems.