USGS NSF GRIP, GSP Opportunity

Point of Contact Name:	Chris Sherwood
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USGS Center:	Woods Hole Coastal and Marine Science Center
Project Title:	Improving Models of Coastal Change
Summary:	Help improve models of coastal erosion and morphologic change! This project offers an opportunity to collect and process various kinds of oceanographic and morphologic data using instruments and images recorded with our beach cam and drones. Or it can be a chance to develop and test numerical models. In either case, the results will help the USGS make forecasts of coastal erosion during storms.
Project Hypothesis or Objectives:	The USGS produces forecasts of coastal vulnerability in advance of tropical storms expected to alter the coastal landscape. These forecasts are relied upon by Federal, state, and local partners but the predictions are qualitative and categorical. They describe only the type of coastal response, but not the expected magnitude of dune retreat or elevation change. In addition, these forecasts are not made for extratropical storms (Nor'easters), which are more frequent and spatially larger than tropical storms and thus are important drivers of coastal change. The USGS plans to develop physics-based quantitative forecasts of coastal change that use morphologic models driven by predicted waves and water levels. The opportunity for the NSF GRIP intern is to develop and test a new approach based on models that include the primary oceanographic forcing of dune erosion (waves and water levels) and are able to encompass both tropical (e.g. hurricanes) and extratropical (e.g. Nor'easters, El Niño) storms. Specifically, the intern will participate in selecting, implementing, and evaluating numerical formulations for coastal morphodynamics that take advantage of existing networks of nested wind, wave, current, and water-level models. The models will be tested against existing and pending data sets describing forcing and observed changes at selected field sites in the northeast.
Duration:	Up to 12 months

Internship Location:	Woods Hole
Field(s) of Study:	Engineering, Geoscience
Applicable NSF Division:	EAR Earth Sciences, OCE Ocean Sciences, HPC High Performance Computing
Intern Type Preference:	Either Type of Intern
Keywords:	coastal erosion geology oceanography morphology drones photogrammetry coastal hazards beaches
Expected Outcome:	The final product of this project will be development and evaluation of one or model components that are candidates for inclusion in a quantitative coastal change forecast system. Work could be presented at a national scientific meeting such as AGU or GSA. Ideally, this product will take the form of a journal paper and/or dissertation chapter.
Special skills/training Required:	Formal education in physical oceanography, process geomorphology, or coastal dynamics. Solid computer skills, including data analysis, photogrammetry, GIS, and/or numerical modeling.
Duties/Responsibilities:	The intern will have various options and associated opportunities. The intern may help collect data at USGS field sites or expand USGS field research to include the intern's study area. Or the intern may choose to work with one of several new datasets, analyzing geomorphic change mapped with drones or imaged with our beach cam. Or the intern may choose to develop and/or apply improved models of coastal change. In any case, the intern will be able (but not required) to work at the USGS Woods Hole science center and take advantage of USGS resources and datasets.