Hydrodynamic and Hydrologic Modeling Intern

Synopsis
The National Oceanic and Atmospheric Administration (NOAA), in partnership with the Chesapeake Research Consortium, seek a summer intern to help evaluate the impacts of improved freshwater inflow modeling on the Chesapeake Bay Operational Forecast System (CBOFS) salinity simulations. The results of this evaluation could then be used to help design improvements to NOAA's operational watershed-estuary forecast systems. Because of the skills needed for this position, we will consider graduate students or students who have completed their undergraduate degree, in addition to current undergraduates.

Project Description
An important part of NOAA's mission is to understand and predict changes in weather, water, climate, oceans, and coasts. Two NOAA line offices, the National Weather Service (NWS) and the National Ocean Service (NOS) provide complementary services when it comes to predicting changes in the Chesapeake Bay. For example, the NWS provides meteorological forecasts to drive the NOS (CBOFS), a 3D hydrodynamic model of Chesapeake Bay developed by the Coast Survey Development Laboratory (CSDL).

There is increasing interest in using CBOFS predictions to drive ecological models. In particular, salinity is a CBOFS output variable which strongly influences biological processes with important human impacts, such as harmful algal blooms, oyster growth, and the occurrence of sea nettles. However, the accuracy of CBOFS salinity predictions are currently unsatisfactory for ecological modelers and do not fully support ecosystem management decisions. NOS modelers have concluded that not accounting for all freshwater inputs is a likely cause for inaccurate salinity predictions. The NWS Middle Atlantic River Forecast Center (MARFC) routinely predicts freshwater inflows to the Chesapeake Bay; however, operational forecasts currently cover only major rivers and about 75% of the watershed. MARFC and the NWS National Water Center (NWC) now have the capability to simulate gridded water flows over the entire drainage area. Initial experiments at MARFC to pass gridded model flows to CBOFS have shown promising improvements in CBOFS salinity simulations. In this project, we will develop more comprehensive validation results from salinity modeling experiments and design real-time prototype experiments as a pre-requisite for operational implementation of these modeling improvements.

Opportunities:
Working side by side with scientists from multiple NOAA offices, this internship offers a unique opportunity to work with and improve an operational model. Specifically, the intern will:
- Run a distributed hydrologic model and format the outputs so they can be ingested by CBOFS
- Learn how to run CBOFS remotely on a high performance computing cluster,
- Run programs to evaluate the skill of CBOFS salinity predictions,
- Interact with NOAA scientists to discuss the requirements for real-time implementation,
- Document and present the results to stakeholders in NOAA's North Atlantic Region

Requirements

- Motivated self-starter with ability to work independently
- College level coursework in physics, mathematics, and basic statistics. Coursework in hydrology, environmental science, oceanography, numerical modeling, hydraulics, fluid mechanics, and/or computer programming is a plus, but not required.
- Strong computing and numerical analysis skills (e.g., experience with spreadsheets or statistical software). Familiarity with, or willingness to learn, basic Linux. Knowledge of GIS a plus, but not required.
- Must be a U.S. Citizen
- Must currently be enrolled in an undergraduate or graduate institution pursuing a degree in science or engineering, or have recently completed (within the last 2 years) an undergraduate degree.

Work Location and Duration

The MARFC will host the intern in State College, PA, and provide guidance on the modeling, model evaluation, and documentation. The intern will also interact with scientists at the NOS CSDL in Silver Spring and Annapolis Maryland to learn about CBOFS, meet staff at the NOAA Chesapeake Bay Office to learn more about how salinity can affect the Bay ecosystem, and interact with scientists at the National Water Center to learn more about real-time hydrologic modeling on NOAA High Performance Computers. The existing infrastructure and expertise at these NOAA Offices can support completion of this project during the anticipated internship period.

The position will begin in mid-May 2017 and conclude in mid-August (12 weeks). Computer and phone services will be provided.

Compensation

The intern will be reimbursed at the end of each month, for a total of up to $4,500 for the equivalent of 12 weeks of full-time activities (480 hours). Funds are available to compensate interns for required work-related travel. Candidates should expect to follow a normal weekday work schedule (roughly 9-5, M-F) with occasional variations for possible field work or other activities. No benefits are provided. A small housing stipend is available for those needing it, and we offer assistance in arranging local housing.

Application Instructions

Applicants are instructed to register with the Chesapeake Jobs online application website: http://communitymodeling.org/bayjob/ to apply. You will be instructed to submit a resume and cover letter, along with three references. The deadline for applications is February 20, 2017.