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## Climate Data for Resilient Development in the U.S.

Robert Griffin

*University of Alabama in Huntsville*

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## RCEU Summer 2017 Project Proposal

**Title:** Climate Data for Resilient Development in the U.S.

**Faculty Mentor:**

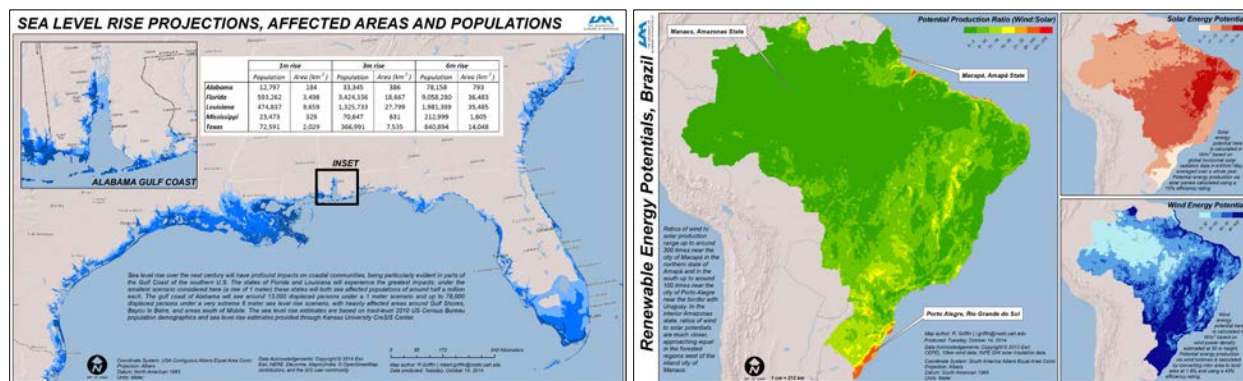
Dr. Robert Griffin, Department of Atmospheric Science | Earth System Science Program  
3049 NSSTC/Cramer Hall, 320 Sparkman Drive, UAH, Huntsville AL 35805

robert.griffin@nsstc.uah.edu    ph: 256.961.7783

*\*\*Previous RCEU Mentor*

**Project Summary:**

The proposed project will engage the student in developing research use-cases for climate change-related impacts in the U.S. Specifically, we will use resources through the White House's Climate Data Initiative (CDI) to address 9 research areas including: Coastal vulnerability, Arctic, Energy infrastructure, Ecosystem vulnerability, Food resilience, Water resources, Human health, Transportation, and Tribal communities. The CDI infrastructure enables researchers to access both climate projections (specifically, forecasted temperature and precipitation patterns) as well as ancillary datasets that could be useful when analyzing climate change impacts. The resources available include geospatially-referenced datasets, including satellite and model imagery (rasters) and infrastructure, political boundaries, and a variety of other point, line, and polygon data (vectors). The student will learn basic techniques in Geographic Information Systems (GIS), geospatial data analysis, and image processing. After being introduced to the software and technology for performing the analyses, the student will help develop use-cases for datasets relevant to the societal benefit areas noted above. The figure below shows the end-results of example analyses of geospatial data focusing on the topics of sea level rise threats and potential production of renewable energy; the student will learn both how to conduct the analyses and how to present research through maps.



**Student Prerequisites:**

Students are not expected to come in with specific technical skills or knowledge sets apart from a genuine interest in the topic area and basic computer skills (MS Office). Students from all academic standings are eligible.

**Student Duties:**

To ensure that the student has the appropriate background to conduct the research, the 12-week summer term will be divided into two phases, scaling up from basic review of contemporary issues in Earth sciences and learning and practicing GIS and satellite remote sensing skills, to finally working to come up with creative ways to use climate datasets for research use-case development and engagement. *This phased technique has worked tremendously for students in past RCEU programs.*

**First phase:** The student will work with Dr. Griffin to review the range of current environmental issues relevant to the CDI focus areas: Coastal vulnerability, Arctic, Energy infrastructure, Ecosystem vulnerability, Food resilience, Water resources, Human health, Transportation, and Tribal communities. These are topics that have key implications related to projected changes in Earth's climate over the next 80 years. During this first phase, the student will also learn basic GIS techniques and data manipulation, focusing on how such concepts can be illustrated in guided labs. The student will also work with Griffin's research team (including graduate and undergraduate students) to understand sources of error inherent in all these datasets. Using both open-source and UAH-licensed software, the student will learn how to process and derive useful information from these datasets, as well as geodatabase management and application.

**Second Phase:** In the final phase the student will select individual examples of imagery from both EarthKAM and ISERV which have coincident overpass dates and will compare their usage using standard image processing techniques. In particular we will focus on the development of research tutorials using these data for the above-noted societal benefit areas, which will ultimately be compiled into a research tutorial package ready for Earth science students and instructors.

**Benefit to the Student:** The student will get exposure and training on a wide range of datasets and software packages, including ArcGIS, the primary commercial software for conducting geospatial analyses; the student will have the opportunity to work as part of an active research team in the Earth sciences, interacting and getting ideas from other undergraduate and graduate Earth science students; the student will also learn how to structure a research question and design to address a question in the Earth sciences; finally, past students who have worked on these projects with Dr. Griffin have gone on to get GRAs through UAH, NASA, and other universities as well as follow-on internships at NASA and elsewhere. The student will receive mentoring on applying to graduate schools, making up a CV/resume, finding jobs, public speaking and presentation of research results, and professional development.

**Student Contribution:** The student will be responsible for interacting with research group members, dedicating the time and effort to learning the software and techniques, using creative thinking to brainstorm ideas relevant to climate change and impacts on our society, and developing tutorial materials and designing research questions for use with CDI datasets.

### **Faculty Supervision and Interaction:**

The student will be supervised throughout the duration of the project by Dr. Robert Griffin. Dr. Griffin has a PhD in environmental anthropology and has worked in the vein of applied GIS and remote sensing in the Earth sciences over a decade. He has also worked with the White House CDI through funded research over the past year. The student will be assigned a fully-equipped computer in the department's geospatial analysis lab with which to conduct his/her research. Supervision by Dr. Griffin will take place at the NSSTC facility where he and the student will establish best methodologies and review progress in weekly team meetings. Finally, Dr. Griffin's graduate assistants located in the NSSTC's Human Dimensions, Discovery, and Decision-Making Lab (HD3) will be present throughout the summer and will be available to assist the student as he/she moves through the phases of the proposed analysis.