



USGS NSF GRIP, GSP Opportunity

Point of Contact Name:	Stacey Archfield
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USGS Center:	National Research Program
Project Title:	Flood frequency analysis under non-stationary conditions.
Project Hypothesis or Objectives:	<p>Flood frequency estimates are a major consideration in hydrologic design of culverts, bridges, and other infrastructure. In using historically observed peak flows to determine the peak design flow, the standard methods assume that the peak design flow will occur in the future with the same probability and magnitude as determined from the historical analysis. With changes to climate, land cover, snowpack, and agricultural and land drainage practices occurring across the United States and potential future changes, the assumption of stationarity in the observed peak flow record may not be valid.</p> <p>It is still largely unknown how on-going and future changes may translate to changes in flood frequency and magnitude and how these changes challenge the current methodology for obtaining flood-frequency estimates. This project is designed to develop a comprehensive description of flood trends (including projected future trends) in the United States and to research appropriate ways to incorporate that knowledge into flood frequency analysis and, ultimately, hydrologic design practices.</p>
Duration:	Up to 12 months
Internship Location:	Reston, VA
Field(s) of Study:	AGS Atmospheric and Geospace Sciences, EAR Earth Sciences, CBET Chemical, Bioengineering, Environmental, and Transport Systems, CMMI Civil, Mechanical & Manufacturing Innovation
Keywords:	Hydrology, Environmental Statistics, Stochastic Hydrology, Floods, Flood Frequency, Non-Stationarity, Climate Change, Urbanization, Land Use Change

● **Expected Outcome:** Results of this project have the potential to impact infrastructure design practices across the Nation. The intern will receive mentorship, opportunities to broaden their professional network, and exposure to USGS culture, mission and research efforts. The USGS will benefit from fresh perspectives from the intern in carrying out its goals.

● **Special skills/training Required:** Completion of a bachelors or masters degree in computer science, earth sciences related discipline (geology, biology, hydrology, etc), engineering, applied mathematics, econometrics or related field. Applicant must be proficient in at least one computer programming language, preferably R.

Knowledge of flood frequency analysis methods, and experience in working with large datasets and GIS is desired.

● **Duties/Responsibilities:** Explore new approaches to the estimation of flood-frequency curves under nonstationary conditions and evaluate robustness of these methods using simulation experiments and observed data. This will include method development and testing on large datasets. Publication of findings in the peer-reviewed literature.

The intern will be able to interact directly with USGS field offices to obtain a deeper understanding of how peak flow data are collected and managed. The position will also afford the intern opportunity to interact with those interested in using tools for applying the methods developed during the research, both within USGS and at outside institutions.
