



# USGS NSF GRIP, GSP Opportunity

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● <b>USGS Center:</b>	Cascades Volcano Observatory
● <b>Project Title:</b>	Volcanic lightning as a monitoring tool for eruption hazards
● <b>Summary:</b>	<p>Volcanic lightning is a powerful new tool to monitor the behavior of high-intensity explosive eruptions, yet many important questions remain unanswered. We seek a researcher from the areas of atmospheric science, volcanology, or engineering to examine the causes and consequence of volcanic lightning, and devise innovative applications at USGS volcano observatories.</p>
● <b>Project Hypothesis or Objectives:</b>	<p>The World Wide Lightning Location Network (WWLLN) is capable of detecting high-energy lightning from remote volcanoes anywhere in the world. In some instances, WWLLN has provided the first indication that an eruption is occurring, providing valuable early warning of impending hazards. However, a number of key questions still need to be tackled. For example, how does volcanic lightning relate to mass eruption rate, plume height, and other environmental factors? Is there a way to improve detection algorithms to distinguish the signature of volcanic lightning from background meteorological lightning? And how can we better include lightning detection in our day-to-day operations to minimize the ash-related impacts on aviation and communities downwind?</p> <p>The primary goal of this project is to integrate lightning detection from WWLLN into volcano monitoring operations within the U.S. Geological Survey. We seek applicants interested in: (1) investigating scientific relationships between globally detected volcanic lightning and eruption dynamics, and/or (2) developing new ways to integrate lightning data into existing data streams.</p>
● <b>Duration:</b>	Up to 12 months
● <b>Internship Location:</b>	Vancouver, WA

- Field(s) of Study:** Engineering, Geoscience
- Applicable NSF Division:** AGS Atmospheric and Geospace Sciences, EAR Earth Sciences, ACI Advanced Cyberinfrastructure, BD HS Big Data Regional Innovation Hubs and Spokes, EFMA Office of Emerging Frontiers and Multidisciplinary Activities, PHY Physics
- Intern Type Preference:** Either Type of Intern
- Keywords:** Lightning  
Atmospheric electricity  
Volcanology  
Volcanic Hazards  
Atmospheric Science  
Volcanic ash
- Expected Outcome:** Results from this project will improve our ability to detect, monitor, and respond to the hazards of explosive eruptions that produce lightning. The application will be particularly valuable for highly active, remote volcanoes in Alaska and abroad, but will also improve our ability to respond to an eruption of high-threat volcanoes in the Cascades (e.g., Mount St. Helens).
- Special skills/training Required:** Depending on the specific research questions targeted by the applicant, he or she will require a strong background in either atmospheric science or physical volcanology. Skills in computer programming (e.g., Matlab, Fortran) and the ability to work with large datasets would be beneficial.
- Duties/Responsibilities:** There are a number of prospective directions for this internship opportunity, each of which will involve collaboration with volcanologists at the U.S. Geological Survey and Prof. Robert Holzworth at the University of Washington (director of WWLLN). One research path is to conduct research into the relationships between volcanic lightning and eruption dynamics, by mining existing records of electrical activity associated with known eruptions. Another direction is to focus on detection algorithms for volcanic lightning to improve automatic alerts and/or integrate WWLLN data into existing monitoring data streams at the USGS and partner institutions. In each case, the intern will interact with vibrant research communities at the University of Washington, Seattle, and the USGS Cascades Volcano Observatory near Portland, Oregon. There will be opportunities to conduct summer fieldwork at volcanoes in the Cascades or Alaska, and interact with field engineers and scientists focused on volcano monitoring and eruption dynamics.
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