



USGS NSF GRIP Opportunity

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USGS Center:	Volcano Science Center
Project Title:	Volcano Emissions Project Gas Geochemistry Internship
Project Hypothesis or Objectives:	Monitoring volcanic gas emissions is a critical tool for tracking activity at potentially explosive volcanoes and for forecasting eruptions. The objective of this graduate research internship is to conduct new research into the isotopic signature of sulfur in gases emitted from Mount St. Helens (MSH) in order to characterize the sources of sulfur (mantle, crustal, hydrothermal) at MSH and the extent of S-isotope fractionation that results from magmatic degassing. Little is known about the S-isotope composition of gases at MSH and these new data will add value to existing long-term gas monitoring and petrologic dissolved volatile data. The overarching goal of this work is to better link surficial gas monitoring data to magmatic degassing processes at MSH, but the approach is sufficiently general that it may prove to have broad applicability to other explosive arc volcanoes.
Duration:	8-12 months
Internship Location:	Vancouver, WA
Field(s) of Study:	Volcanic Degassing, Volcanology, Isotope Geochemistry, Igneous Petrology
Expected Outcome:	Results from this project will improve our understanding of the behavior of sulfur in the Mount St. Helens magmatic system and will contribute toward establishing improved functional linkages between gas monitoring data and petrologic models of degassing. The intern will be exposed to instrument development and fieldwork in collaboration with a team of USGS scientists who conduct state-of-the-art volcanic gas monitoring at one of the most iconic and highest-threat volcanoes in the US.

● **Special skills/training
Required:**

A strong background in igneous geology, isotope geochemistry, and an understanding of the behavior of volatiles in volcanic systems is necessary. Experience with field measurements of volcanic gases (e.g. direct sampling, mini-DOAS, Multi-GAS) is highly favorable. Applicant must be physically capable of fieldwork in rugged terrain at moderate-high elevations in the presence of volcanic gases.

● **Duties/Responsibilities:**

The intern will design and construct a wet-chemical sulfur-isotope gas sampling system and conduct fieldwork at Mount St. Helens (MSH) to collect samples from SO₂ and H₂S-rich gas plumes. Subsequently, the intern will take part in analyzing the S-isotopic signature of the samples at USGS or university stable isotope laboratories. The intern will then develop a geochemical model for magmatic degassing at MSH, based on these isotopic measurements in conjunction with long-term gas monitoring data and previous petrologic studies of the MSH magmatic system. This work may serve as a basis for a graduate thesis or dissertation, with continuing input from USGS collaborators even after the formal completion of the internship period.