

## USGS NSF GRIP, GSP Opportunity

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● <b>USGS Center:</b>	USGS Alaska Science Center (at UW School of Oceanography)
● <b>Project Title:</b>	Examining controls on the solubility in the ocean of iron from dust and volcanic ash
● <b>Summary:</b>	Biological productivity in the Gulf of Alaska is limited by availability of the micronutrient iron. Dust derived from Alaskan glacial flour and from Asian deserts, and ash from Alaskan volcanoes, episodically supply iron from the atmosphere. This internship would carry out solubility studies on archived material from a variety of dust and ash samples to examine controls on the supply of this important micronutrient.
● <b>Project Hypothesis or Objectives:</b>	Atmospheric inputs of dust and volcanic ash are suggested to be an important source of the trace element iron to the ocean, especially in regions such as the Gulf of Alaska where biological productivity is limited by availability of iron. However, estimates of the degree to which iron is solubilized in the ocean from dust and from volcanic ash vary by more than an order of magnitude, and probably vary with environmental conditions. We hope to test how the solubility differs among Alaskan and Asian dust samples and among various Alaskan volcanic ash samples. This work could include dissolution experiments carried out in fresh water spanning a range of pH values, intended to mimic conditions in clouds and in precipitation, and/or experiments in seawater, both with and without a variety of naturally occurring organic ligands that are thought to complex iron in solution and enhance its solubility.
● <b>Duration:</b>	Up to 12 months
● <b>Internship Location:</b>	Seattle, WA
● <b>Field(s) of Study:</b>	Chemistry, Geoscience
● <b>Applicable NSF Division:</b>	EAR Earth Sciences, OCE Ocean Sciences
● <b>Intern Type Preference:</b>	Either Type of Intern
● <b>Keywords:</b>	Nutrient, iron, productivity, ligand, glacier, volcano, desert
● <b>Expected Outcome:</b>	The project will provide a valuable research experience to the intern and exposure to different USGS projects, including a project that monitors

volcanic ash deposition and its impact(s) on the terrestrial landscape (through the Alaska Volcano Observatory), and a project that examines the sources and behavior of iron to the coastal Gulf of Alaska region from dust, from rivers and from coastal sediments (through the Coastal and Marine Geology Program).

● **Special skills/training Required:** The intern should be capable of carrying out geochemical and/or biological experiments. Ideally, s/he would have experience with trace-metal-clean sampling and experimentation, but this is not a necessity, as this could be taught. The laboratory and instrumentation needed to carry out the work is available in Seattle.

● **Duties/Responsibilities:** The intern will carry out experiments either in the laboratory, or at sea, to quantify the degree to which Fe from dust and ash samples is dissolved upon deposition on water. The intern will also analyze the samples by inductively coupled plasma mass spectrometry (ICP-MS). The intern will have access to ash samples that are in the possession of Kristi Wallace of the USGS Volcano Science Center (Anchorage), and a variety of dust samples in the possession of John Crusius (USGS Alaska Science Center, affiliated with and located at the UW School of Oceanography, Seattle). The intern will have access to various background information on each of these samples, including ash eruption and dust deposition histories, as well as some background geochemical information.