USGS NSF GRIP, GSP Opportunity

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USGS Center:	Alaska Science Center
Project Title:	Streamflow partitioning in glacierized basins using geophysical techniques
Summary:	Engage with a dynamic team to integrate research across multiple disciplines, while at the same time contributing to filling a significant knowledge gap in climate science. This position will expose you to amazing places, datasets and mentors.
Project Hypothesis or Objectives:	In glacierized basins, stream flow is derived from snowmelt, icemelt, precipitation, and groundwater in varying proportions through time. Additionally, some fraction of the water originates from the glacier footprint, while some comes from the free portion of the basin. Understanding the timing and magnitude of water delivery from these sources requires robust and quantitative partitioning of streamflow among the various components. Vertical motion of the glacier ice (i.e., submergence and emergence velocity) complicates this partitioning. The objective of this internship is to combine seasonal Digital Elevation Model (DEM) differencing (LiDAR and Structure from Motion platforms) with ground-penetrating radar (GPR) acquisitions of snow water equivalent to quantify the fractional contribution of on- and off-glacier snowmelt. The aim is to produce an over-determined problem such that method uncertainties can be derived from the data.
Duration:	Up to 12 months
Internship Location:	Anchorage, AK
Field(s) of Study:	Geoscience, glaciology, hydrology, geophysics
Applicable NSF Division:	AGS Atmospheric and Geospace Sciences, EAR Earth Sciences, OCE Ocean Sciences, PLR Polar Programs
Intern Type Preference:	Either Type of Intern

Keywords:	glaciology, hydrology, geophysics
Expected Outcome:	As glacier volume continues to decrease worldwide, water budget partitioning is important to anticipate changes in the magnitude and timing of water to downstream stakeholders. The expected outcome of this work is a manuscript describing the method and performance of the joint geophysical analysis as well as the water-balance partitioning. The intern will work closely with a broad team of academic and government scientists, including glaciologists, snow hydrologists, GPR, and LiDAR experts, and geochemists.
Special skills/training Required:	Scientific computing skills are central to this position. The applicant should be familiar with MATLAB or Python. Applicants should be comfortable working with large, complex data sets, and database skills are considered a strong asset. Glaciological field work may be an option, but is not required. Applicants should have degrees in Earth or computer science coursework and experience with glaciological theory is desired.
Duties/Responsibilities:	The intern's duties will include DEM differencing and/or constructing and differencing snow-water equivalence maps. Much of the work will involve analyzing previously collected data, for which a considerable amount of the initial processing will have been completed. The initial responsibility of the intern will be to develop a platform to analyze the multiple data sets in order to facilitate the task of developing a water balance. As the analysis approaches completion, the intern will shift attention to manuscript preparation. If appropriate, an opportunity will be made for the intern to visit the site of data collection, perhaps supplementing the existing data sets.