

USGS NSF GRIP Opportunity

 Point of Contact Name:	Shad O'Neel
 Point of Contact E-mail:	soneel@usgs.gov
 USGS Center:	Alaska Science Center
 Project Title:	Constraining glacier dynamics through nested-resolution remote sensing
 Project Hypothesis or Objectives:	<p>Time-lapse imagery is emerging as a powerful tool in glaciology, but its full potential has not been realized. This project will continue to develop the ability to leverage time-lapse sequences with remote sensing products to better resolve space-time patterns of glacier flow dynamics. For example, nested-resolution flow fields may provide insight into step changes in ice flow that occur during large calving events. We hypothesize that the high temporal resolution of the time-record can resolve short-time-scale ice dynamics when integrated with the broad spatial resolution of remote sensing products (e.g., TerraSAR-X). Extensive time-lapse and remote sensing data sets from Greenland's Helheim Glacier, and Columbia Glacier, Alaska will form the core of this project.</p>
 Duration:	8-12 months
 Internship Location:	Anchorage, AK
 Field(s) of Study:	Glaciology, computer vision, photogrammetry
 Expected Outcome:	<p>Substantial tradeoffs exist between spatial and temporal resolving power of field and remote sensing methods focused on tidewater glacier ice dynamics (motion and calving). Current methods do not resolve triggered or threshold processes well because the changes happen at time scales much shorter than those over which remote sensing products are acquired. This work has the potential to make a substantial contribution to sub-annual forcing for tidewater glacier behavior. As such, the contribution will help to fill one of the most significant knowledge gaps in sea-level change research. The intern should expect to lead or co-author a manuscript on the integrative work performed during the internship.</p>

● **Special skills/training
Required:**

Scientific computing skills are central to this position. The applicant should be familiar with MATLAB or python, and some prior exposure to photogrammetry. 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 some experience with glaciological theory is desirable.

● **Duties/Responsibilities:**

The internship may focus on extracting information from time-lapse imagery, such as velocity fields or glacier terminus positions. Much foundational work exists in this field, but application of computer-vision methods will greatly enhance output. The intern may also investigate how to incorporate such short duration results into longer time-scale analyses of remote sensing products. The latter half of the internship will focus on manuscript preparation.