Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

The applicant is developing a mechanistic model -- requiring the untangling of feedbacks and nonlinear behavior -- to understand the controls contributing to the advance and retreat of tidewater glaciers. His academic preparation is outstanding; the applicant has mathematical skills that surpass those of most people working on geophysics. Upon graduation from the University of Montana with a BS in geography (according to his transcripts) or geosciences (according to his application), he pursued an MS degree in computer science, working primarily on computational aspects of glaciology. The applicant then worked as a research associate for 2.5 years at Montana developing (solely) a finite-element simulator capable of modeling glacier movement. He is currently at the University of Alaska, Fairbanks, working on the Taku glacier, which has a 50-year set of observational and surface mass balance data. The applicant has excellent oral and written communication skills, as seen in his application as well as stated in the recommendation letters. His recommendation letters are all highly supportive of his abilities.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

The broader impacts of the applicant's work is that the results are crucial toward quantifying cryosphere response to climate change, and hence our ability to estimate the human costs of climate change. The results of this research may also be important to unraveling ecological questions related to tidewater glaciers.

Summary Comments

The applicant aims to study the mechanisms of glacial retreat and advance of the Taku glacier, which in additional to its scientific importance, has important societal relevance. The intellectual merit of the proposal is excellent, and the broader impacts are very good. All three recommendation letters speak of the applicant's exceptional intellectual abilities, motivation, and drive. They also state of the applicant's ability to become a leader in this field.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields: The proposed study has the potential to significantly improve our understanding of the movement of tidewater glaciers. 2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts? The potential is high. 3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success? Yes, although the plan does not incorporate a mechanism to assess success. 4. How well qualified is the individual, team, or institution to conduct the proposed activities? Very qualified. 5. Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities? Yes.

Broader Impacts Criterion

Overall Assessment of Broader Impacts
Very Good

Explanation to Applicant
The broader impacts section can be significantly improved, e.g., to include undergraduate students and to involve members in underrepresented groups.

Summary Comments
A strong proposal with the potential to make significant discoveries.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit
Excellent

Explanation to Applicant
The first thing that sticks out about this applicant is his impressive publication record. He is first author on three peer-reviewed publications and a co-author on others. He has been awarded several small grants and awards in recognition of his research. His undergraduate research on measuring and modeling subglacial hydrologic pathways has led to several high profile papers and presentations. After graduation he developed an ice sheet model, which is currently being used for active research. His proposed research combines further numerical modeling, but in concert with field measurements to examine the dynamics of Taku Glacier in Alaska. His reference letters highlight his unique traits as an ice sheet modeler and observationalist. His intellect, productivity and curiosity are apparent in all letters, which rank him as a top 5% student.

Broader Impacts Criterion

Overall Assessment of Broader Impacts
Excellent

Explanation to Applicant
The applicant has leadership experience (through NOLS) and proven ability to work productively in team situations. His written and spoken communication skills are excellent and his research addresses an important societal question (understanding the controls of glacier behavior). He is eager to communicate his science to a wider audience and has the computational and communication skills to build interactive visualizations. His Broader Impacts statement could have been better developed though.

Summary Comments
A top candidate who has proven his productivity and research ability already. His letters of reference rank him as one of the best.