Research Statement

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I'm enthusiastic about enhancing our understanding of the stability of the largest ice sheet on Earth under changing climate. Antarctic Ice Sheets (AIS) have the potential to contribute more than 50 meters of sea level rise by melting and collapsing, processes that are accelerating at a frightening rate during recent years. There are multiple numerical models simulating the stability and dynamics of AIS, however, there is one mechanism that has been overlooked by most – the interaction between the subglacial hydrology system and the overlying ice sheet. Studies have unveiled that, for a large percent of AIS, the basal temperature is around the pressure melting point and active subglacial water has been observed at many locations across the continent. Therefore, it is of great importance that we quantitatively understand how the subglacial hydrology system impact the dynamics of the ice sheet and couple this effect into numerical models in order to provide more accurate predictions. My research is motivated by this need and I believe that my research scope will be a natural fit into the Department of Earth and Planetary Science at UC Berkley.

Current Research

During my years at University of Texas Institute for Geophysics (UTIG), my research has focused on investigating the subglacial hydrology, geomorphology and geology of Princess Elizabeth Land (PEL), East Antarctica, by combining airborne geophysics survey and numerical simulation methods. For long, PEL has been the largest missing piece in the community's understanding toward the subglacial conditions of Antarctica, majorly due to the lack of geophysics survey coverage. Over the past five years, our group at UTIG has been coordinating collaborations among multiple international institutes to perform airborne geophysics survey in PEL. From the collected data, I confirmed the existence of one of the largest subglacial lakes in Antarctica for the first time and constrained its geological framework, which provides important reference for hypotheses of the tectonic evolution of Antarctica.

Field work has been a substantial part of the training I received at UTIG. From hours-long discussions in meeting rooms about experiment plans, to insuring all the logistic support for the field season, then to hand-on operation in the frozen world, and finally to processing the collected data and providing guidance for future survey, being involved in the whole circle of field work not only trained me a good geophysicist, but also taught me how to work as a member of large teams and efficiently collaborate with people from different backgrounds.

Future Research

I will continue to investigate the geological control over the subglacial hydrology system and its impact on the ice dynamics in Antarctica. More specifically, I plan to constrain the geological framework from geophysics survey data, and then simulate the subglacial groundwater transportation in PEL and its interaction with the overlying ice body with numerical models implementing Finite Element Method (FEM). I am also interested in investigating how the subglacial hydrology system affect the preservation of old ice record, which will provide critical reference for the site-picking of old ice target drilling aiming to obtain paleo-climate record.

My research tends to be strongly multidisciplinary and collaborative as it involves topics of applied geophysics, glaciology, geology, hydrology and plate tectonics. Department of Earth and Planetary Science at UC Berkley is the home to many amazing geoscience researchers, and I look forward to building collaborations with them. As a teaching assistant, I taught the graduate level course "Modeling Flow and Transport in Porous Media", providing students with hand-on training of groundwater transportation with numerical models. Among all the teaching experience, teaching this course specifically prepared me for involving graduate and undergraduate students into the aforementioned research projects.

In closing, my research and training experience have shaped me a qualified researcher and I believe my research will contribute to the excellence and diversity of Department of Earth and Planetary Science at UC Berkley.