

Name: William Kochtitzky

Year: 2018

Observing the 2018 surge of Turner Glacier, Disenchantment Bay, Alaska

Dates: June 7-14, 2018

Location: Turner Glacier, Disenchantment Bay, Alaska (working out of Yakutat)

Team members: William Kochtitzky and Andrew Nolan

Key Accomplishments:

We visited Yakutat, Alaska where we successfully completed a field season working on Turner Glacier. We accomplished two days on the boat, where we took photographs and ground control points. We had one day in the air to take air photographs. From this work, we documented the terminus of the glacier through ground photographs and created an elevation model of the surface of Turner Glacier. From this work we now also have a orthorectified high resolution image of Turner.



Turner Glacier seen from Disenchantment Bay on boat

Presentation/Publication of Results:

Conference abstract

Conference title: American Geophysical Union

Date: December, 2018

Location: Washington DC

Presentation title: Kinematics of the Unprecedentedly-Short Surge Cycles of Turner Glacier, St. Elias Mountains, Alaska, from 1984 to 2017

Authors: Nolan, A., Kochtitzky, W., Enderlin, E., McNabb, B., Jiskoot, H., and Kreutz, K.

Abstract: Surge-type glaciers exhibit a short active phase of rapid ice velocity followed by a quiescent phase of stagnant flow typically lasting years to centuries. Our analysis of the Landsat archive focuses on five unexamined surge events of Turner Glacier (St. Elias Mountains, Alaska) from 1984 to 2017. Surge events were identified by variations in velocity measurements produced by offset tracking and terminus delineation of Landsat images. Surge events occurred in 1985-1986, 1991-1993, 1999-2001, 2006-2007, and 2011-2013. We show that Turner Glacier has a 5-year surge repeat interval and an active phase length of one to two years. Compared to the typical ~15-year repeat interval of Alaskan glaciers, this is the fastest documented surge repeat interval in Alaska and possibly the world. Surge events result in dramatic increases in velocities and terminus advance. ASTER digital elevation models (DEMs) from the 2006-2007 and 2011-2013 surge events show mass build up in the reservoir zone preceding the surge with mass redistribution to the terminus as a result of the surge. The short repeat interval of Turner Glacier provides a unique opportunity to study the internal ice-instabilities controlling surge kinematics at a higher temporal resolution than ever before. These insights into internal ice-instabilities provide a valuable proxy to the internal instabilities of the major ice streams of Greenland and Antarctica, which are crucial to understand for future sea-level projections.

Journal article (in preparation)

Journal title: Journal of Glaciology

Paper title: Kinematics of the Unprecedentedly-Short Surge Cycles of Turner Glacier, St. Elias Mountains, Alaska, from 1984 to 2017 (working title)

Authors: Nolan, A., Kochtitzky, W., Enderlin, E., McNabb, B., Jiskoot, H., and Kreutz, K.

Research impact:

One of the big questions in glaciology currently is how do glaciers become unstable and how much will sea level rise in the coming decades. This project is documenting an instability event at Turner Glacier, which will allow us to better understand how glaciers become unstable. This glacier is unique because it undergoes a surge event every 5 years, allowing us to carefully compare surge events to understand the dynamics in the system. Thus, this work is our start of trying to understand why glaciers become unstable.



Will and Andrew on boat near Hubbard Glacier

Thank you for working with us!