Geophysical Research Abstracts
Vol. 21, EGU2019-1450, 2019
EGU General Assembly 2019

Drygalski Ice Tongue stability influenced by crevasse formation and ice morphology

Christine Indrigo (1), Christine Dow (1), Duncan Young (2), Choon-Ki Lee (4), Jamin Greenbaum (2), Don Blankenship (2,3), Won Sang Lee (4,5)

(1) University of Waterloo, Department of Geography and Environmental Management, Waterloo, Canada, (2) Institute for Geophysics, Jackson School of Geosciences, University of Texas at Austin, Austin, USA, (3) Department of Geological Sciences, Jackson School of Geosciences, University of Texas at Austin, Austin, USA, (4) Unit of Ice Sheet and Sea Level Changes, Korea Polar Research Institute, Incheon, Republic of Korea, (5) Polar Sciences, Korea University of Science and Technology, Incheon, Republic of Korea

The Drygalski Ice Tongue is one of the largest ice tongues in Antarctica, extending 140 km into the Ross Sea. The ice tongue prevents the break up of sea ice within the Ross Sea and may also impact polynya formation within Terra Nova Bay to the North. We use a combination of remote sensing techniques and numerical modelling to examine the stability of the ice tongue.

In 2005, iceberg B15-A collided with the tongue terminus, breaking off a large section of ice. In 2006, iceberg C-16 collided with the terminus, resulting in a total loss of 11 km in length from both calving events. These events have been captured in Landsat 7, MODIS, and ENVISAT ASAR imagery and provide an opportunity to examine pre- and post-calving properties of the ice tongue to determine how the tongue reacts after large mass loss. We use Landsat GoLIVE products from 2014 to 2017 to calculate ice strain, which we compare with the location of basal channels identified from aerial ice penetrating radar surveys and inversion of surface DEMs. We also apply feature tracking to four large crevasses using Landsat imagery from 1988 to 2017 to determine velocity along the tongue and rate of change of the frontal position. Water flux rates and subglacial channel location over the grounding line are determined by applying the Glacier Drainage System (GlaDS) model to the David Glacier catchment, which feeds into Drygalski Ice Tongue.

Preliminary results suggest that there is a relationship between calving events, ice tongue velocity, and formation of new crevasses. These crevasses in turn control the location of future calving. There is also a relationship between basal channel location and ice surface strain rates, which may impact the transverse propagation distance of the marginal crevasses.