EGU21-15039
https://doi.org/10.5194/egusphere-egu21-15039
EGU General Assembly 2021

Dense Glacial Termini Time Series Analysis: Insights from Calving Front Machine (CALFIN)

Daniel Cheng[1], Eric Larour[2], and Wayne Hayes[1]
[1]University of California Irvine, Irvine, USA
[2]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA

Sea level contributions from the Greenland Ice Sheet are influenced by the rapid changes in glacial terminus positions. While manual delineation is labor intensive, recent developments in the field of automated calving front extraction have allowed for high spatio-temporal resolution analysis of Greenlandic glaciers. Specifically, we analyze new developments and results from the Calving Front Machine (CALFIN). CALFIN uses machine learning in the form of deep neural networks to automatically generate 25,000+ calving front positions from 1972 to 2020 across 80+ Greenlandic basins, using Landsat and Sentinel-1 imagery. With this data, we perform a correlative analysis between area changes, centerline length changes, discharge, thickness, bed topography, and temperature, among others. Trends on the local and regional scales are examined for insights in conjunction with existing studies in the field. Ultimately, the current implementation offers a new opportunity to explore trends on the extent of Greenland's margins, and supplies new constraints for simulations of the evolution of the mass balance of the Greenland Ice Sheet and its contributions to future sea level rise. We welcome any critiques, suggestions, or questions regarding the dataset and/or our methods. This work was conducted as a collaboration between NASA's Jet Propulsion Laboratory and the University of California, Irvine.