Introduction

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Curvenote

The main.ipynb notebook summarizes and discusses the results of the comparison between karamoram_analysis.ipnyb and the non-karakoram_analysis.ipnyb.

1 Introduction

1.1 Glaciers have become an icon of anthropogenic warming and climate change. It is well known throughout the world that most glaciers are in steep decline. However, there is one small region in Pakistan, the Karakoram, which has emerged as the largest of the very few examples of glaciers continuing to grow today (Hewitt, 2005, p. 339). Glaciers in this region have exhibited mass stability or even expansion, contrasting the mass loss seen in the nearby Himalayas and Tibetan Plateau as well as other mid-latitude glaciers globally (Kapnick et al., 2014, p. 834). The Karakoram has become well known for being an anomaly. Glaciologists have hypothesized factors such as great elevations, relief, and distinctive climatic regimes (Hewitt, 2005, p. 339). From 2000-2020, "the region has shown balanced to slightly positive glacier budgets, an increase in glacier ice flow speeds, stable to partially advancing glacier termini and widespread glacier surge activity" (Farinotti et al., 2020, p. 8). Surge-type glaciers go through a quiescent phase, where flow is normal and slow, as well as an active phase where they surge to a higher flow velocity, often factored 10-100 times the normal flow (Davies, 2020, p. 2202).

1.2 This analysis compares the South Rimo Glacier in the Karakoram with two other "Surge Type" glaciers: the Medvezhiy Glacier in the Pamir mountains of nearby Tajikistan and the Nàłùdäy/Lowell Glacier in Northwestern Canada. The project seeks to answer whether there is evidence of the Karakoram anomaly within this comparison, using statistical analysis of glacial velocity. Increased velocity is associated with decreased glacial mass, as a glacier can slide across a bed rock surface faster if there is less mass (i.e. friction) keeping it in place. We do this by creating preprocessing visualizations, analyzing mean velocities over time as well as within seasonality, and visualizing cumulative mean velocity and acceleration trends, combined with overall evaluation and comparison.

2 Data Description ³