

What's in a Gigaton? Using detailed mapping of Greenland's ice to better resolve and communicate ice sheet dynamics

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Recent advances in remote sensing capabilities have provided observations over the polar regions in unprecedented detail, including the ability to monitor ice flow at high temporal resolutions. By combining several independent optical and radar data sources, we resolved short-term (weekly to ~monthly) variability in glacier speed and dynamic ice loss across the Greenland Ice Sheet. We show how we use satellite monitoring with short image acquisition intervals to better understand seasonal variability in glacier speed and describe how this seasonality varies across regions of the ice sheet. We will discuss how short-term dynamical changes contribute to the overall ice sheet mass imbalance, and how the timing and duration of short-term acceleration events can offer clues to underlying glacier dynamics. Similar methods are then applied to regions beyond the calving front (delineated for several glacier outlets by white lines in the attached figure) in order to track the motion of mixed mobile sea ice and icebergs in the proglacial fjord. Finally, we present challenges associated with polar literacy and connecting the public to polar research. We highlight how improved remote sensing capabilities and data visualization can be a powerful tool for engaging audiences with the concept of rapid dynamical changes and to the impacts of climate change on polar landscapes.

