Patterns of Glacier Variability in Greenland

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Advances in remote sensing technology provide a continually expanding dataset to study changes in Greenland's 200+ outlet glaciers. Observed overall changes for fast-flowing, marine-terminating glaciers include a mean velocity increase of ~30% from 2000 to 2010, increases in terminus retreat during the 2000's as compared to the 1990's, and general reductions in ice thickness. However, notable regional and local variability exists within these broad overall patterns. Many studies have demonstrated that the most marked changes have largely occurred along the northwest and southeast coasts, where ~80% of mass loss from ice dynamics is concentrated, though these regions do not change synchronously. Locally, even neighboring glaciers may have significantly different behavior, likely due to the complex interaction between ice dynamics, atmospheric and oceanic conditions, and glacial setting. With improving temporal and spatial data resolution and more data types available, however, we are progressing toward a better understanding of the hierarchy of environmental mechanisms controlling ice dynamics. These research advances are critical for understanding current ice sheet changes and predicting future affects on global sea level rise.

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