

Using zigzags to quantify surface melt (in Greenland)

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Ice strata are exposed in the ablation zone at the margin of the Greenland ice sheet. Ice penetrating radar show that these strata dip at a low angle into the interior of the ice sheet. When the ice surface is incised by meltwater channels, these outcropping strata form large, km-scale zigzags across the surface. In geological mapping this simple zigzag effect is known as the “rule of Vs”, where the amplitude of the zigzag is determined by the relative dip of the stratum and the surface topography. Over time, ice flow moves the ice sheet stratigraphy towards the margin, but surface melt moves the outcrop of this stratigraphy down dip, i.e. towards the interior of the ice sheet. By examining satellite imagery from the summer months, we are able to use the year-to-year displacement of the outcropping zigzag strata to compare the relative influence of ice flow and surface melt. In this way we use the rule of Vs to document increased surface melt over the last decade.