

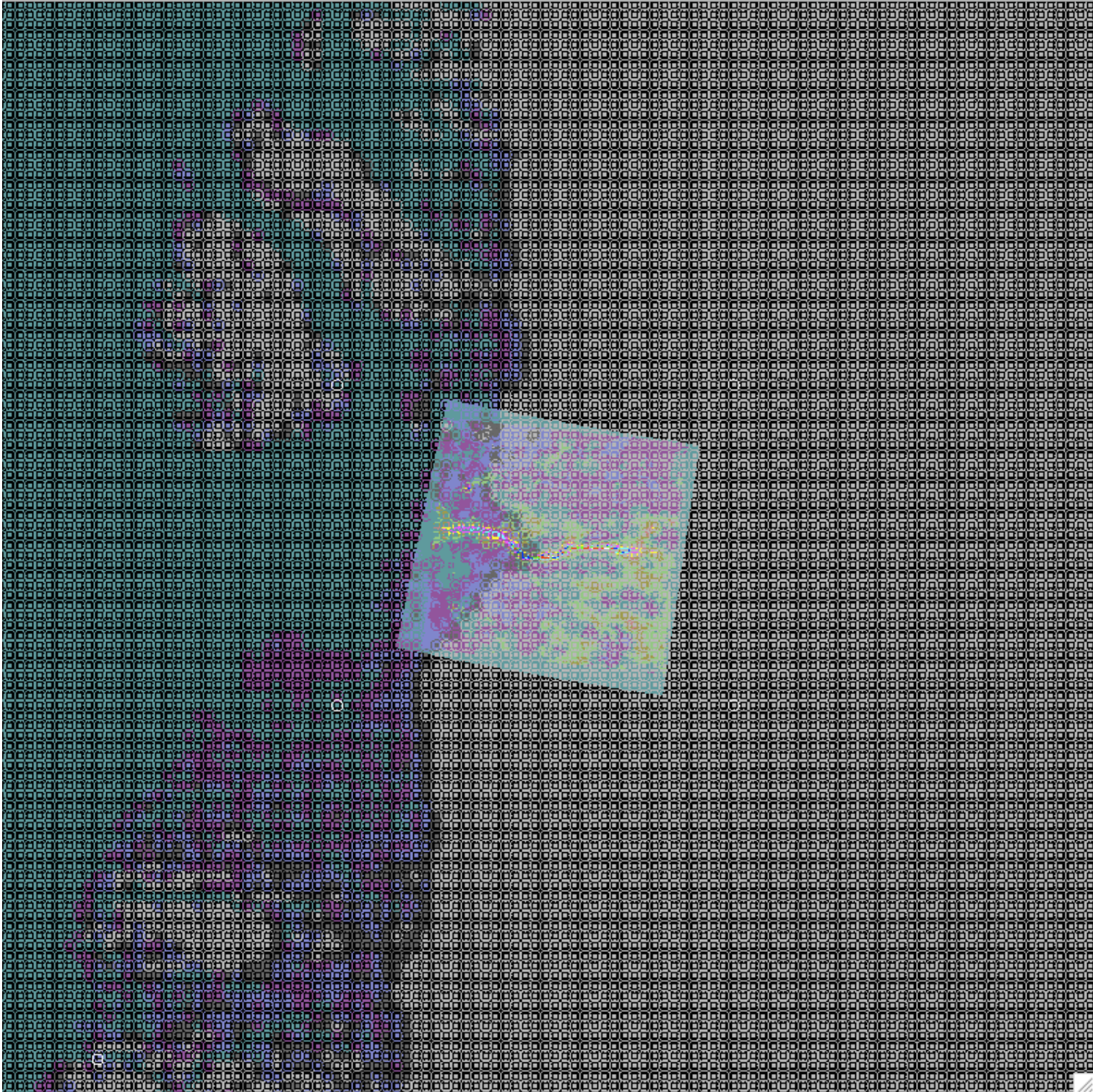
# **The Dilemma of RESOLUTION: How Good is Good Enough: A Case Study from Greenland**

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Many of the whole-icesheet modelers involved with SeaRISE are attempting to predict the response of the Greenland and Antarctic Ice Sheets to projected climate change, and as such are using a database of the present icesheets' configurations provided by Jesse Johnson ([http://websrv.cs.umt.edu/isis/index.php/SeaRISE\\_Assessment](http://websrv.cs.umt.edu/isis/index.php/SeaRISE_Assessment)). These datasets include surface elevation, thickness, bedrock elevation, and other critical boundary conditions required by the icesheet models. Both Greenland and Antarctica are provided at 5 km resolution.

We have seen from previous work that an accurate representation of the bed is essential if models are to produce reasonable results. As we look at the response of the icesheets to projected climate change, we wonder how good our resolution must be, especially in the fast-flow areas of the ice streams, many of which are topographically controlled.

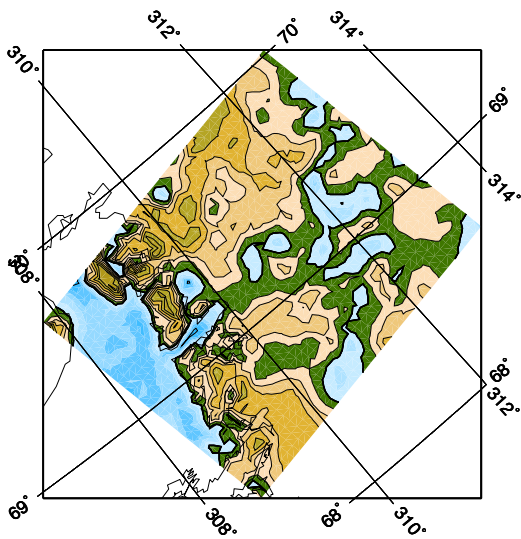
CRESIS has provided us with a very high-resolution representation of the bed in the Jakobshavn catchment area (Figure 1), and we show the results of 1) using this high-resolution dataset at a degraded resolution comparable to the whole-icesheet dataset provided by Jesse Johnson, and 2) using progressively higher resolutions to more accurately capture the deep channel in which the Jakobshavn Ice Stream flows (Figure 2). This is done using the embedded-model feature of UMISM, whereby a higher-resolution, small-domain model (the ice stream) is run inside a lower-resolution, broader-domain model (the whole icesheet).





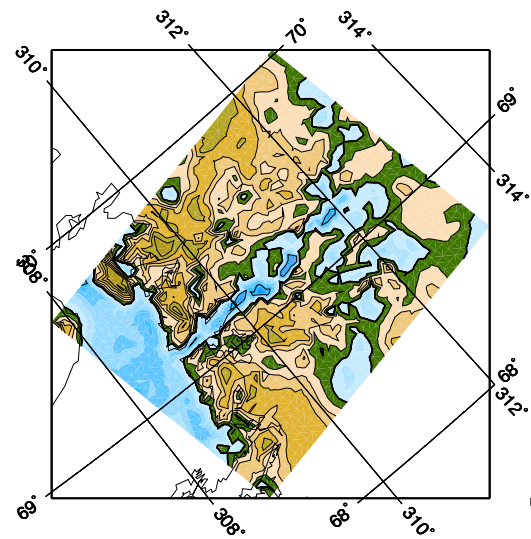
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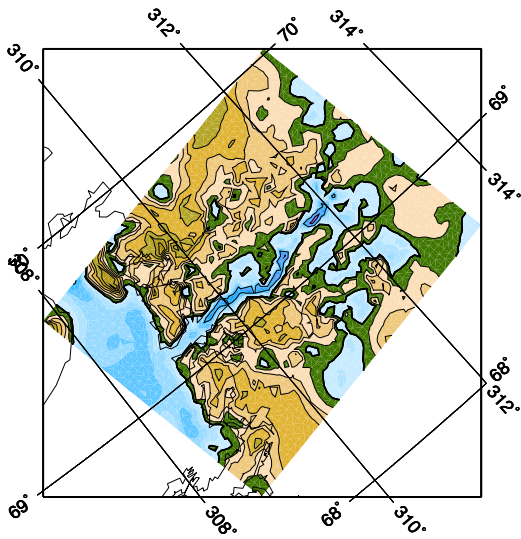
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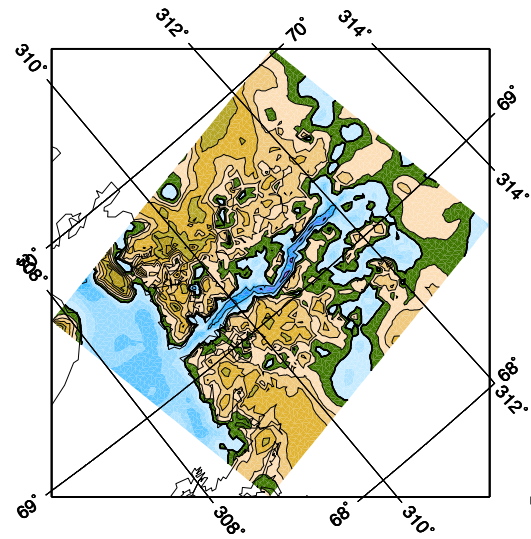
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[4\_km\_with\_CRESIS]



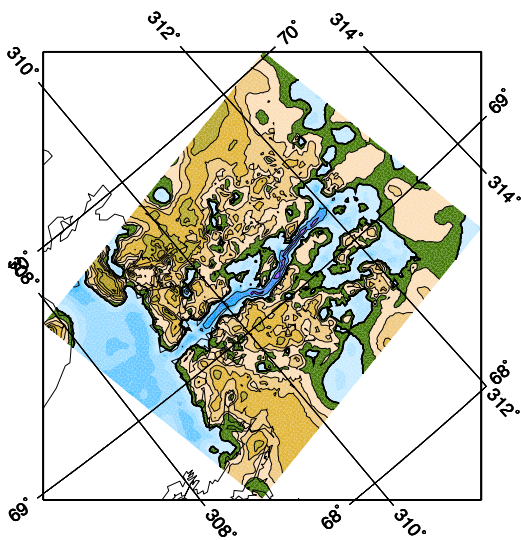
[3]

[3\_km\_with\_CRESIS]



[2]

[2\_km\_with\_CRESIS]



[1]

[1\_km\_with\_CRESIS]

