

Approaches to minimising risk in glaciated terrain travel

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Overview



- With expeditions into glaciated regions on the planet becoming more commonplace there is need to identify potential hazards for safe operational planning. Surface crevasses are one of the hazards
- Example from support provided for "The Longest Journey", a polar expedition that has the record for the longest solo unsupported polar journey.
- Typically satellite imagery is used for this purpose but has several issues including coverage and ability to detect snow covered crevasses.
- Our approach enhances the use of imagery with interpretation of important derived quantities, that included inferred crevassing potential, and other terrain conditions and hazards.
- Here we present some examples of the route analysis and evaluation with what was actually found under field conditions with snapshots from footage obtained during the record breaking journey.



THE LONGEST JOURNEY

<https://www.thelongestjourney.com.au/>



- Solo and unsupported 5,200 km journey: skis and kite
- Return from Novolaskaya Station (Novo) via Dome Argus (Dome A) highest point.
- In support of charity the **McGrath Foundation**



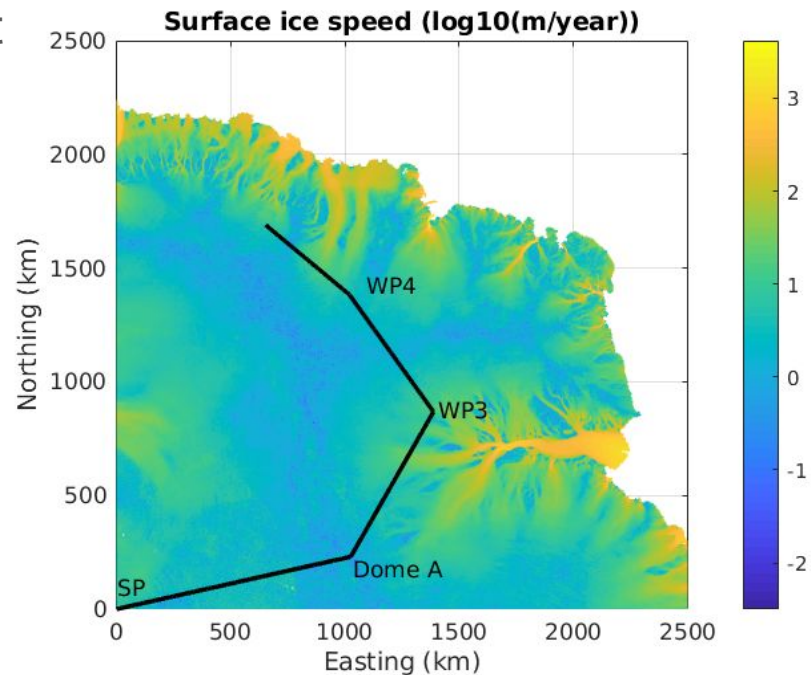
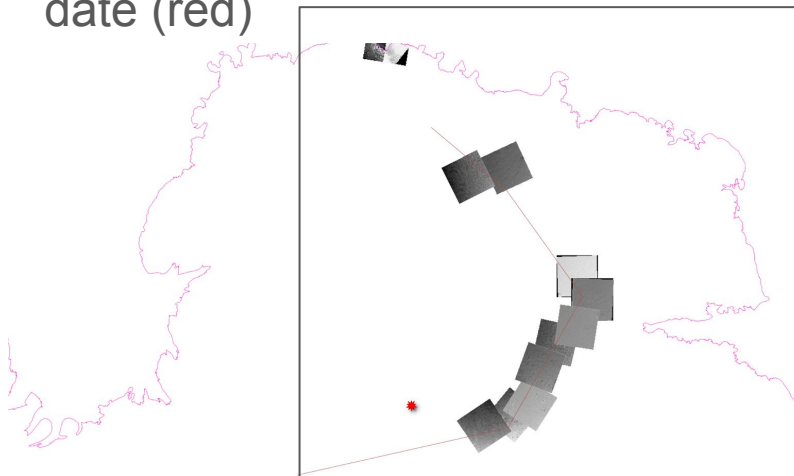
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Requested evaluation along proposed route (right image)

- Known crevasses are on pathway onto Antarctic plateau, so hazard assessment not needed
- Left image: Available Landsat images over the proposed route, up until 4 December 2019, showing the location of Geoff on that date (red)



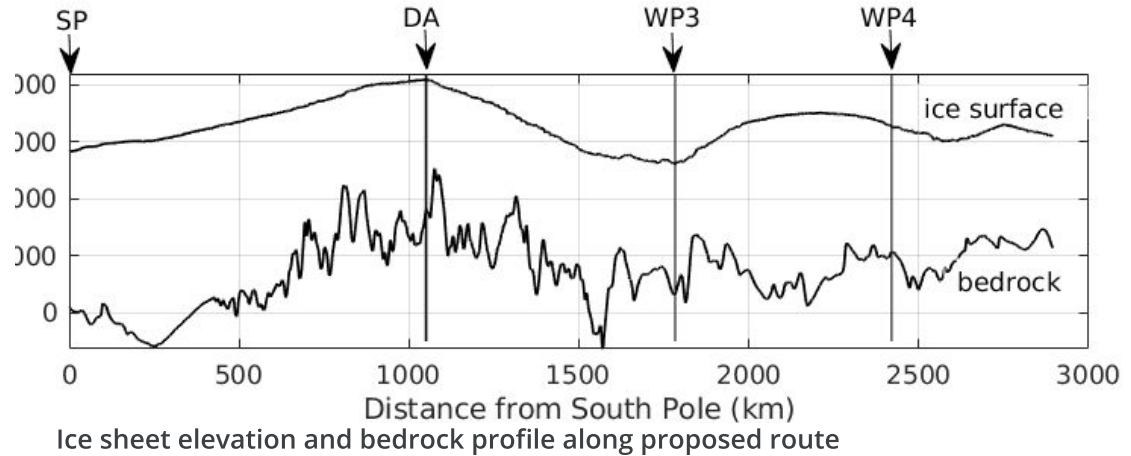
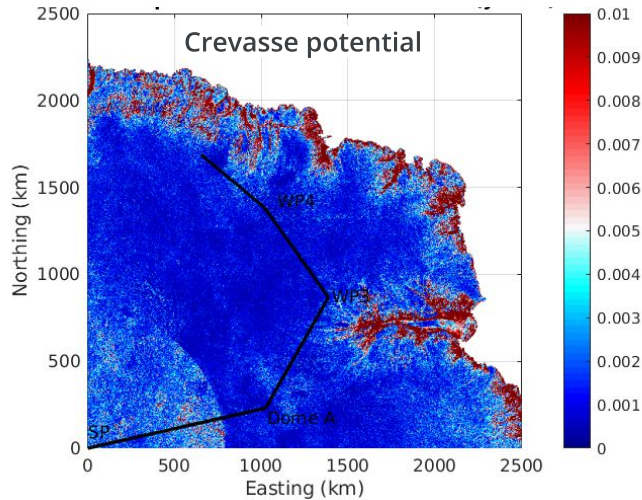
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Derived products

- Available data was analysed along the proposed route from South Pole (SP) -> Dome Argus (DA) -> Way Points 3 and 4 (WP3 and WP4) to provide a coarse-scale resolution (~1 km) theoretical crevasse potential. High values are considered to be areas that are vulnerable to the formation of surface crevasses.
- Analysis of derived products was supplemented with inspection of satellite visible imagery.

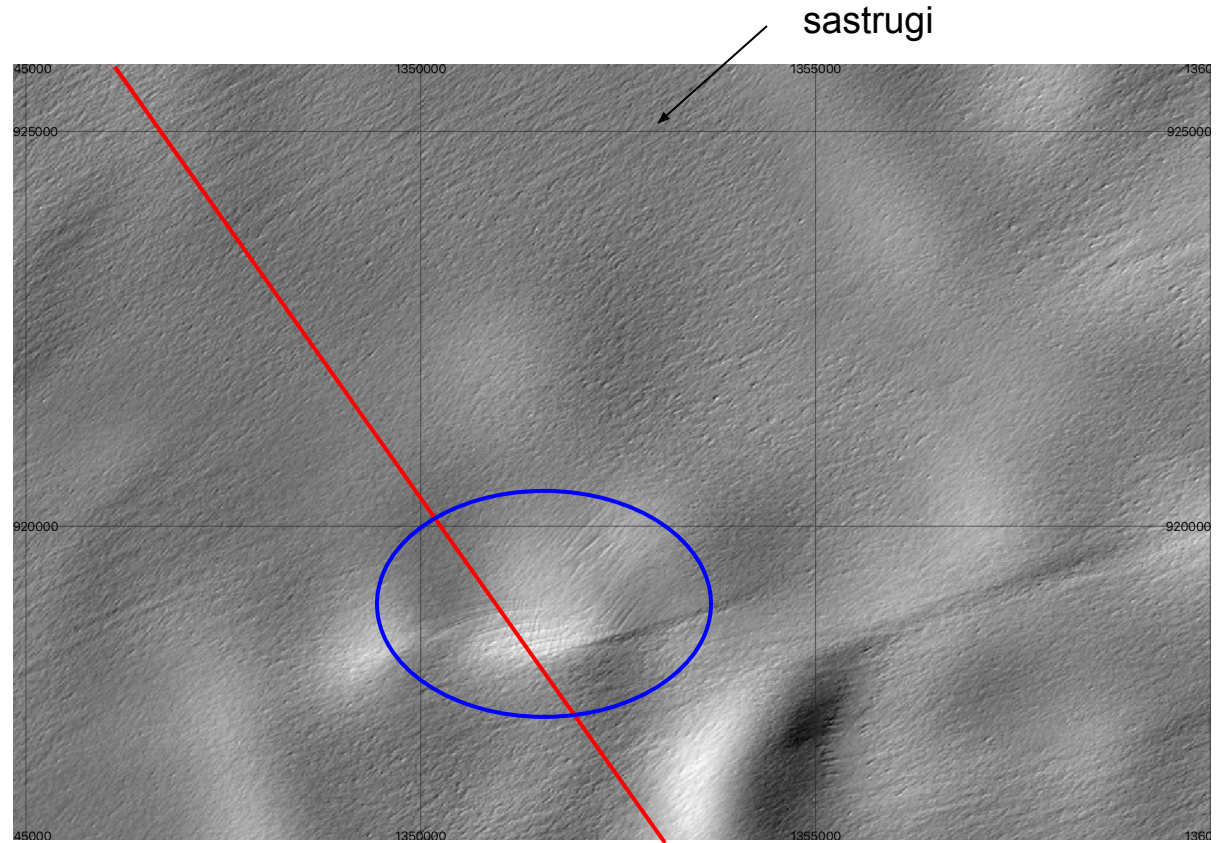


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A crevasse field covered by snow bridges are visible (blue ellipse), along the proposed route (red line)

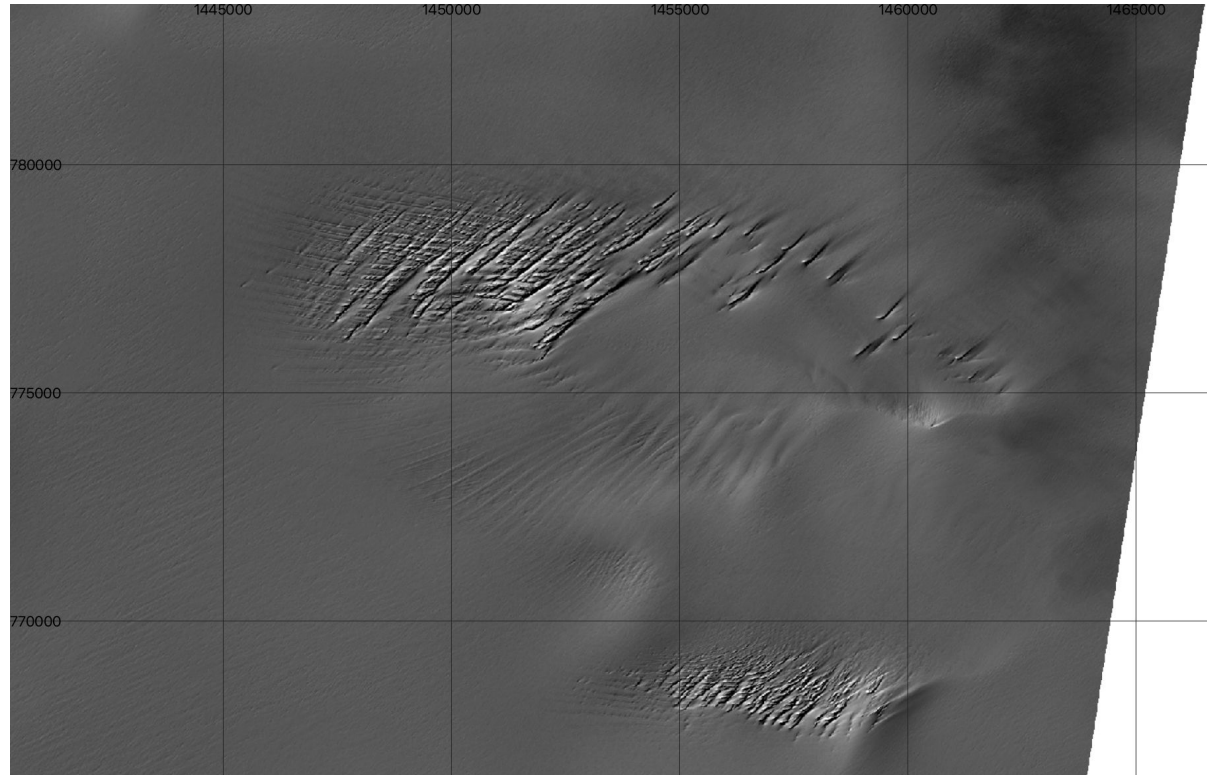


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An example image showing open crevasses in comparison with those identified along the route (last slide). Image acquired about 100km to the north of the identified crevasse field.



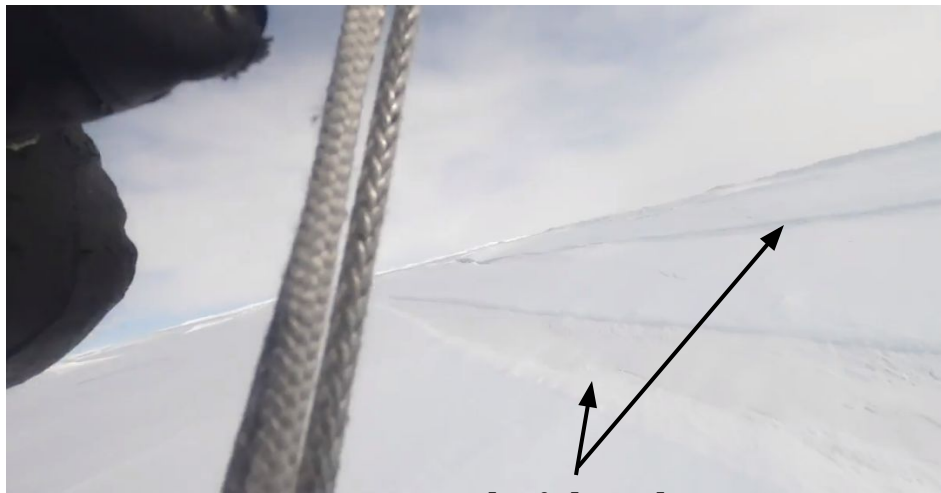
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Back to Novo and off the proposed route

- Crevasse field encountered with many open crevasses and narrow crevasses covered by snow bridges
- What can happen when you go off course
- “In my attempt to use the wind angle I had been pushed further East than expected. Whilst this ensured no manhauling (all wind power) it pushed me into some dangerous terrain. This terrain eventually pushed me into very nasty crevassed ice. The crevasses were huge, pattern complex and in short a very dangerous situation.”
Geoff Wilson



Snow bridged crevasses



Summary

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- Crevasses covered by snow bridges were seen in satellite data at a location, in agreement with other derived quantities in the region.
- The remaining route showed no visible crevasses or areas indicative of crevasse formation from the derived quantities.
- Crevasses were encountered in regions that were understood to contain crevasses.
- The approach uses expert interpretation and data analysis to supplement remote sensing imagery and derived data products.
- Implementing the approach during expedition planning can improve safety outcomes in remote areas where support is limited.

For more information on this talk or advice on assessing risks in glaciated terrain, please email info@skadinu.com

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