What lies under the Greenland Ice Sheet?

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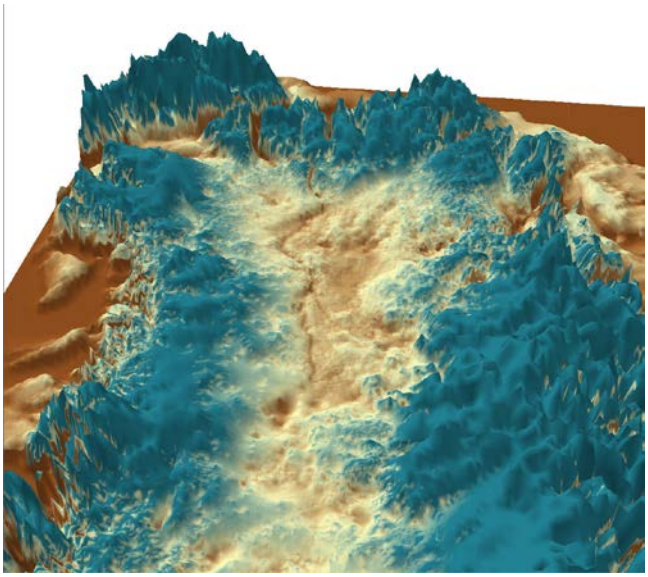
Project description: Despite several decades of satellite and airborne geophysical surveys over Greenland (the largest island in the world) there is still much that we do not know about the properties of the bedrock that lies underneath the ice sheet that covers 81% of the island. Only recently, the largest canyon in the world (at least 750 km in length) was discovered beneath the ice (Bamber et al, 2013a): see Fig 1. Of particular interest to glaciologists trying to model the evolution of the ice sheet is whether the bed is wet or dry and rough or smooth. These and other basal properties can be derived from ice penetrating radar (IPR) data, which has been collected by US, German, Danish and UK scientists over several decades (Bamber et al, 2013b). A huge archive of largely unstudied data exist for the ice sheet and the aim of this project is to use these data to elucidate the basal and englacial properties of the ice sheet, focusing on properties most relevant to numerical modelling and ice dynamics. This will include working with colleagues at the Jet Propulsion Lab, Caltech, Pasadena who have developed a novel and valuable method for obtaining ice thickness in coastal areas where IPR is problematic (Morlighem et al, 2011).

The project will build on the tools and methods developed to produce the new bed digital elevation model in Bamber 2013a starting by incorporating more recently acquired data within a collaborative NERC project with the University of Cambridge, and results from the group at JPL. It will then go on to examine the basal properties under the ice sheet using data on reflected radar power and signal properties. The project will also investigate the englacial stratigraphy captured in the IPR data, which provides important clues related to basal melt rates, flow variability and paleo-accumulation rates.



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