

Evolution of the Greenland Ice Sheet from satellite altimetry and SAR

Supervisors

Main supervisor: Professor Jonathan Bamber (Geography, Bristol)

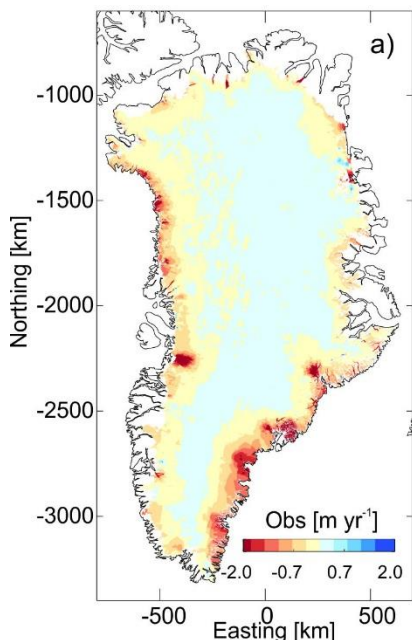
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Host Institution: University of Bristol

Project description:

The Greenland ice sheet is currently the single largest contributor to sea level rise and the rate has been increasing steadily over the last two decades. Mass loss has been through a combination of changes in the speed of glaciers (ice dynamics) and increased melting at the surface (surface mass balance). We have satellite radar and laser altimeter measurements of elevation change over the ice sheet extending back to 1995 (see the figure which show elevation changes for the period 2003-2009 from the ICESat laser altimeter mission; Hurkmans et al 2014) but often with poor accuracy and coverage for the areas experiencing the largest changes. In 2010, CryoSat 2 was launched with an improved capability over these fast changing sectors. The aim of this project is to use CryoSat 2, in combination with measurements of surface velocity from synthetic aperture radar data and gravity data from the GRACE mission, to investigate the mass balance of the ice sheet with greater accuracy and resolution than previously achieved and to separate the effects of surface melting from those due to ice dynamics by combining the different observations. This combination of observations is a powerful way to investigate the underlying causes of changes in mass balance and the project offers the opportunity to learn about state of the art techniques in satellite remote sensing alongside tackling an important problem in climate change research and glaciology.



The successful candidate will receive training in all aspects of the problem including the principles of satellite remote sensing, glaciology, and computing. You will be working with leading scientists in these fields in a vibrant and lively group that is the largest university-based glaciology centre in the UK. You will be co-supervised by an expert in SAR interferometry from the University of Exeter as well as international partners working with the BGC. A background in a numerate discipline in science or engineering would be advantageous. The ideal candidate would have some experience of remote sensing.

Reference:

Hurkmans, R. T. W. L., Bamber, J. L., Davis, C. H., Joughin, I. R., Khvorostovsky, K. S., Smith, B. S., and Schoen, N.: Time-evolving mass loss of the Greenland Ice Sheet from satellite altimetry, *The Cryosphere*, 8, 1725-1740, 2014.