Geophysical Research Abstracts
Vol. 12, EGU2010-2837, 2010
EGU General Assembly 2010

Interpolation of sub-glacial topography incorporating weighting functions derived from multiple co-variables

David Vaughan
British Antarctic Survey, Cambridge, United Kingdom (d.vaughan@bas.ac.uk)

Current methods for interpolation of ice-thickness and sub-glacial bed elevation data do not generally take account of co-variables that contain information about the sub-glacial topography. Here we develop and test algorithms that allow incorporation of the information contained in various co-variable fields (here I use, distance to rock outcrop, surface roughness and ice-surface elevation), which can be shown to be related to sub-glacial topography. The technique is based on weighting measurements around an interpolation point using these fields as indicators of the expected similarity the measurements will have to bed-elevation at the interpolation point. The method is demonstrated, and tested on real data from around Evans Ice Stream, Antarctica. Quanitatively, the technique performs at least as well, and often better, than traditional methods. Qualitatively, the technique produces a sub-glacial topography with stronger topographic containment of ice-flow units, more realistic expression of linear features which are identifiable in the satellite imagery, but which traditional methods of interpolation do not capture in the sub-glacial topography. Furthermore, this weighting approach, which actually a rather weak form of intervention, allows the final sub-glacial topography to honour the input data as well as traditional methods but does not involve evaluating specific correlations and so avoids regional tuning.