A new, high-resolution digital elevation model of Greenland fully validated with airborne laser altimeter data - DTU Orbit (17/12/2018)

A new digital elevation model of the Greenland ice sheet and surrounding rock outcrops has been produced at 1-km postings from a comprehensive suite of satellite remote sensing and cartographic data sets. Height data over the ice sheet were mainly from ERS-1 and Geosat radar altimetry. These data were corrected for a slope-dependent bias that had been identified in a previous study. The radar altimetry was supplemented with stereophotogrammetric data sets, synthetic aperture radar interferometry, and digitized cartographic maps over regions of bare rock and where gaps in the satellite altimeter coverage existed. The data were interpolated onto a regular grid with a spacing of similar to 1 km. The accuracy of the resultant digital elevation model over the ice sheet was assessed using independent and spatially extensive measurements from an airborne laser altimeter that had an accuracy of between 10 and 12 cm. In a comparison with the laser altimetry the digital elevation model was found to have a slope-dependent accuracy ranging from -1.04 +/- 1.98 m to -0.06 +/- 14.33 m over the ice sheet for a slope range of 0.0-1.0 degrees. The mean accuracy over the whole ice sheet was -0.33 +/- 0.97 m. Over the bare rock areas the accuracy ranged from 20 to 200 m, dependent on the data source available. The new digital elevation model was used as an input data set for a positive degree day model of ablation. The new elevation model was found to reduce ablation by only 2% compared with using an older, 2.5-km resolution model, which suggests that resolution-induced errors in estimating ablation are no longer important.

General information
State: Published
Organisations: National Space Institute
Contributors: Bamber, J., Ekholm, S., Krabill, W.
Pages: 6733-6745
Publication date: 2001
Peer-reviewed: Yes

Publication information
Journal: Journal of Geophysical Research: Solid Earth
Volume: 106
Issue number: B4
ISSN (Print): 1934-8843
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.19 SJR 2.272 SNIP 1.475
Web of Science (2017): Impact factor 2.752
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.36 SJR 2.369 SNIP 1.558
Web of Science (2016): Impact factor 2.733
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.39 SJR 2.754 SNIP 1.605
Web of Science (2015): Impact factor 3.318
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.27 SJR 2.853 SNIP 1.757
Web of Science (2014): Impact factor 3.426
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.38 SJR 3.088 SNIP 1.809
Web of Science (2013): Impact factor 3.44
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.93 SJR 2.917 SNIP 1.522
Web of Science (2012): Impact factor 3.174
ISI indexed (2012): ISI indexed yes