A Big Earth Data Platform for Three Poles

**A new Greenland digital elevation model derived from ICESat-2**

1、Description

Greenland digital elevation models (DEMs) are indispensable to fieldwork, ice velocity calculations, and mass change estimations. Previous DEMs have provided reasonable estimations for the entire Greenland, but the time span of applied source data may lead to mass change estimation bias. To provide a DEM with a specific time-stamp, we applied approximately 5.8×108 ICESat-2 observations from November 2018 to November 2019 to generate a new DEM, including the ice sheet and glaciers in peripheral Greenland. A spatiotemporal model fit process was performed at 500 m, 1,2, and 5 km grid cells separately, and the final DEM was posted at the modal resolution of 500 m. A total of 98% of the grids were obtained by the model fit, and the remaining DEM gaps were estimated via the ordinary Kriging interpolation method. Compared with IceBridge mission data acquired by the Airborne Topographic Mapper (ATM) Lidar system, the ICESat-2 DEM was estimated to have a maximum median difference of -0.48 m. The performance of the grids obtained by model fit and interpolation was similar, which both agreed well with the IceBridge data. DEM uncertainty rises in regions of low latitude and high slope or roughness. Furthermore, the ICESat-2 DEM showed significant accuracy improvements compared with other altimeter-derived DEMs, and the accuracy was comparable to those derived from stereo-photogrammetry and interferometry. Overall, the ICESat-2 DEM showed excellent accuracy stability under various topographic conditions, which can provide a specific time-stamped DEM with high accuracy that will be useful to study Greenland elevation and mass balance changes.

2、Keywords

Theme：Galactic System  
Discipline：Solar-Terrestrial Physics and Astronomy  
Places：Greenland  
Time：May 2019

3、Data details

1.Scale：None

2.Projection：North\_Pole\_Stereographic

3.Filesize：189.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：84.0 | - |
| west：-74.0 | - | east：-10.0 |
| - | south：59.0 | - |

5、Time frame:2019-04-30 16:00:00+00:00--2019-05-30 16:00:00+00:00

6、Reference method

References to data:

SHEN Xiaoyi, KE Changqing, FAN Yubin. A new Greenland digital elevation model derived from ICESat-2. A Big Earth Data Platform for Three Poles, doi:10.11888/Geogra.tpdc.2713362021

References to articles:

7、Supporting project information

8、Data resource provider

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