Notice Concerning Detection of ICESat/GLAS Inter-Campaign Elevation Biases

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Summary

ICESat Science Team members have detected inter-campaign elevation biases from different areas and various surface types across the globe. The Release 33 data reprocessing (elevation level 633) includes the parameter *i_ElevBiasCorr* on GLA06/12/13/14/15 products. However, this bias has not been classified: different groups estimate different biases. Therefore, this parameter should not be used.

Full Description

ICESat mission science requirements specify that the elevations computed from the combination of the GLAS range measurements, the Precision Orbit Determination (POD), and the Precision Pointing Determination (PPD) information should have an accuracy of 15 cm or better. This requirement has been met.

However, relative elevation biases between campaigns have been detected that are below this 15 cm requirement yet have significant confidence. In part, detection of these biases is due to the discrete nature of the campaign mode data collection. Each of the 18 ICESat measurement campaigns is distinct from the others in one or more ways, collecting measurements under a set of unique conditions. For example, differences occur due to: the specific laser used (three in all), including nominal footprint size, footprint shape, and transmit energy level and decay rate; spacecraft orientation and angle with respect to the Sun and Earth; and variable conditions such as cloud cover and surface reflectivity.

Several members of the ICESat Science Team Precision Range Determination (PRD) group have been investigating these inter-campaign elevation biases for some time. They have estimated these biases in different regions, over different surface types, and via

different methods, yet no consistent pattern has emerged that explains or correlates all of the estimates.

There is general agreement within this group that the maximum campaign biases are on the order of 5-10 cm, that early campaigns (having higher laser energy) exhibit these larger biases, and that the inter-campaign bias differences stabilize (approach zero trend) at the mid- and low-energy-level campaigns.

In essence, the group acknowledges that biases exist, that their specific origin remains unknown, and, as they are below the 15 cm requirement, no bias (zero correction) will be provided on the Release 633 elevation data products.

Members of this PRD group are collating current inter-campaign bias results for publication. It is expected that investigation into the nature of these biases will continue beyond this publication and beyond the end of official ICESat mission data reprocessing.

For further information, please contact one of the authors of this document.