

## Supplementary Material

### The determination of the snow optical grain size diameter and snowmelt area on the Greenland ice sheet using spaceborne optical observations

Baptiste Vandecrux<sup>1</sup>, Jason E. Box<sup>1</sup>, Adrien Wehrlé<sup>1,2</sup>, Alexander A. Kokhanovsky<sup>3</sup>, Ghislain Picard<sup>4</sup>, Masashi Niwano<sup>5</sup>, Maria Hörhold<sup>6</sup>, Anne-Katrine Faber<sup>7</sup>, Hans Christian Steen-Larsen<sup>7</sup>

<sup>1</sup> Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark

<sup>2</sup> University of Zurich, Zurich, Switzerland

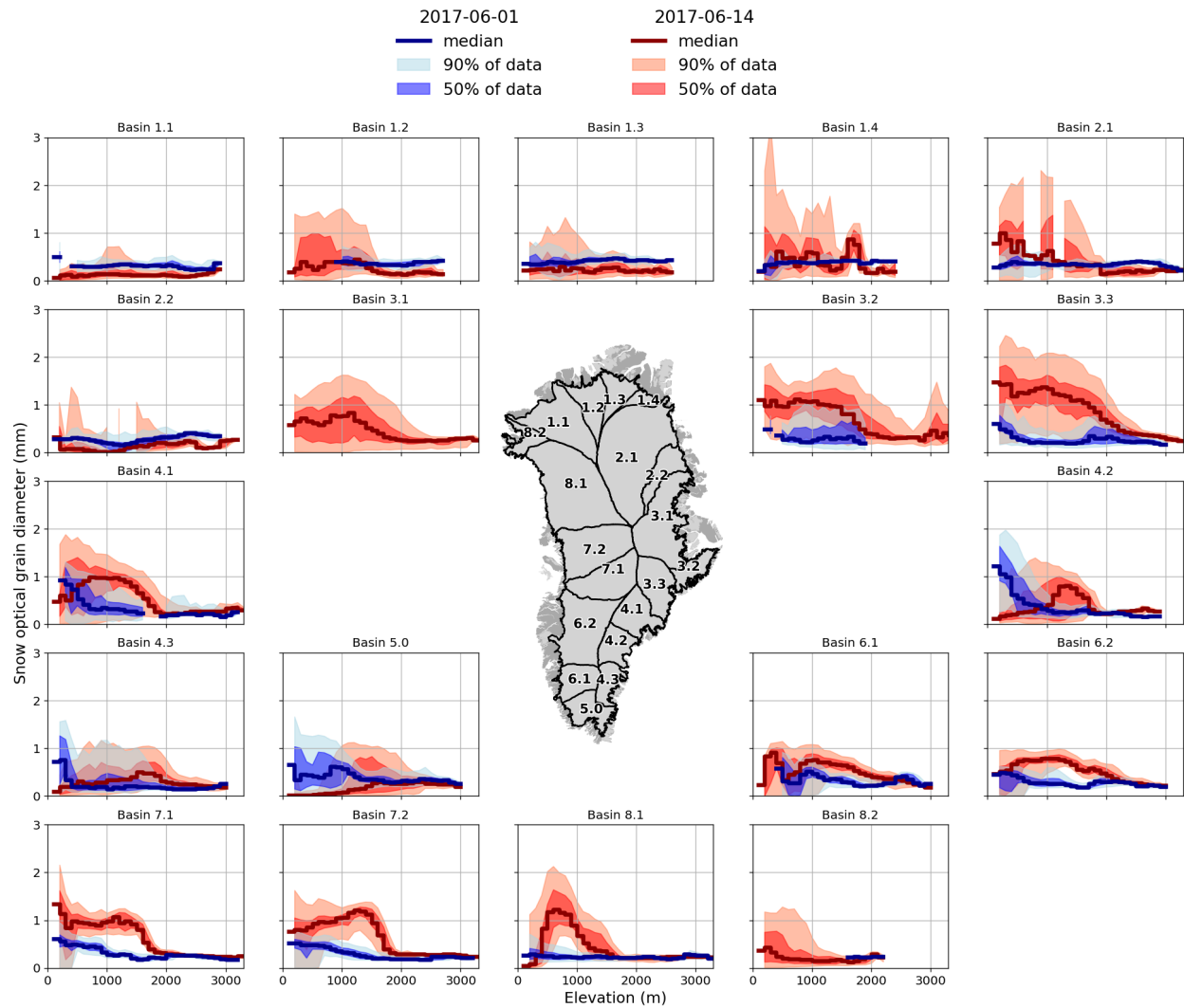
<sup>3</sup> Telespazio Belgium, Bratustrasse 7, 64295 Darmstadt, Germany

<sup>4</sup> University Grenoble Alpes, CNRS, Institut des Géosciences de l'Environnement (IGE), UMR 5001,  
Grenoble 38041, France

<sup>5</sup> Physical Meteorology Research Department, Meteorological Research Institute, Tsukuba, Japan

<sup>6</sup> Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar-und Meeresforschung, Am Handelshafen 12,  
27570 Bremerhaven, Germany

<sup>7</sup> Geophysical Institute, University of Bergen and Bjerknes Centre for Climate Research, Bergen, Norway



Supplementary Figure S1: Retrieved optical snow grain diameter distribution on 01 June 2017 and 14 June 2017 with regards to elevation for the different drainage basins of the ice sheet (Zwally et al., 2012). Within each basin, the median, the envelope containing 50% of the data and the envelope containing 90% of the data within 100 m wide elevation bins are calculated and displayed as a solid line, dark and light shading, respectively.

Supplementary Table S1. Result of the sensitivity analysis. For each subset, an analysis of variance is conducted to find the step function, and its associated threshold value of grain diameter, that explains most of the variance in the subset.

Subset	Number of samples in subset	Threshold grain diameter
only KAN_U	195	0.64

only KPC_U	148	0.68
all except CEN	556	0.64
all except EGP	511	0.64
all except KAN_U	529	0.65
all except KPC_U	576	0.64
only 2019	283	0.64
only 2019	225	0.45
only 2019	216	0.65
Average		0.63
Standard deviation		0.07

## Reference

Zwally, H. Jay, Mario B. Giovinetto, Matthew A. Beckley, and Jack L. Saba, 2012, Antarctic and Greenland Drainage Systems, GSFC Cryospheric Sciences Laboratory,  
[http://icesat4.gsfc.nasa.gov/cryo\\_data/ant\\_grn\\_drainage\\_systems.php](http://icesat4.gsfc.nasa.gov/cryo_data/ant_grn_drainage_systems.php)