Supplementary Information

**A scale-dependent model to represent changing aerodynamic roughness of ablating glacier ice based on repeat topographic surveys**

**Authors**

Thomas Smith1, Mark W. Smith1\*, Joshua R. Chambers 1, Rudolf Sailer 2, Lindsey Nicholson3, Jordan Mertes4, Duncan J. Quincey1, Jonathan L. Carrivick 1 and Ivana Stiperski3

**Supplementary Tables S1-S2**

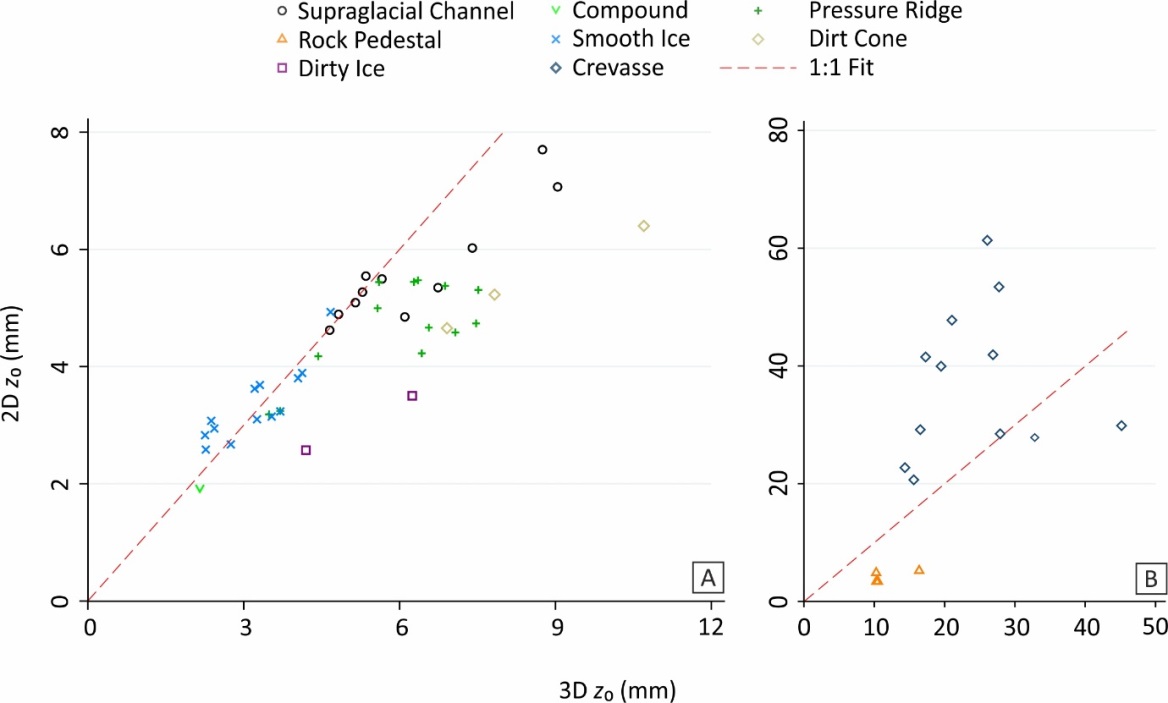
**Supplementary Figures S1-S2**

**Supplementary Table S1**. List of references associated with data points numbered in Figure 1.

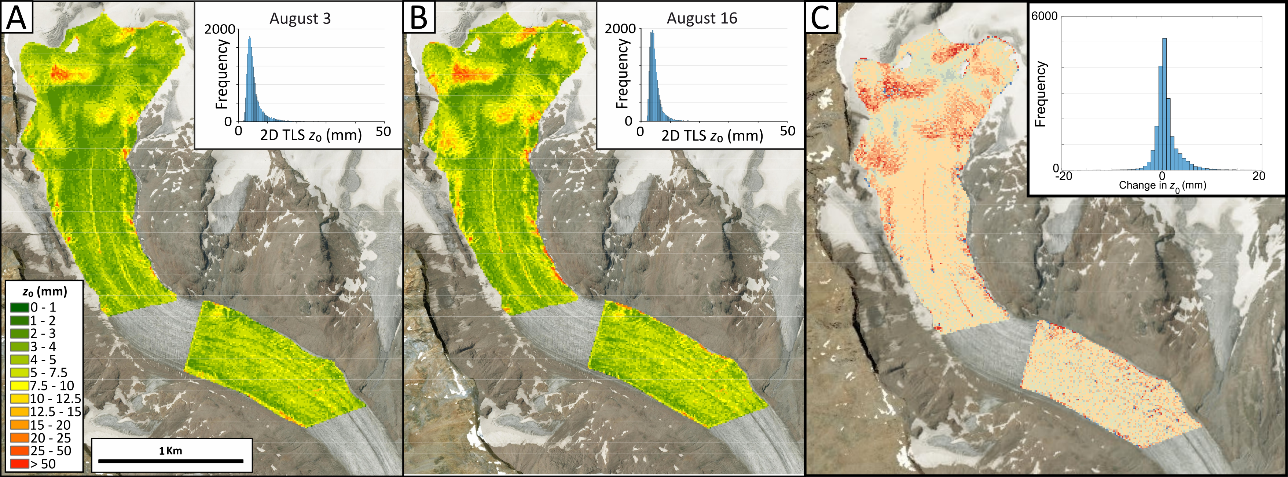
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| Glacier | Reference |
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**Supplementary Table S2**. Mean change in 2D *z*0 over 3rd August – 16th August of classified exposure zones. Standard deviation is in square brackets.

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| **Number of days exposed:** | **Change in 2D *z*0 (mm)** |
| < 2 weeks | 1.10 [1.68] |
| 2-3 weeks | 1.06 [1.99] |
| 3-4 weeks | 0.56 [1.91] |
| 4-5 weeks | 0.43 [2.51] |
| 5-6 weeks | 0.32 [2.12] |
| > 6 weeks | 0.34 [2.51] |



**Supplementary Figure S1.** Comparison of plot averages for 2D and 3D *z*0 estimates for all surveys. 1:1 fit displayed by red dashed line. Note the change in axes scales in (B).



**Supplementary Figure S2.** Map of estimated 2D *z*0 for the 3rd(A) and 16th (B) day of study, and change in *z*0 between the two dates (C).