

1 **Supplementary Material: Outlet glacier flow response to**
2 **surface melt - based on analysis of a high resolution**
3 **satellite data set**

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12 **REFERENCES**

- 13 Morlighem M and 25 others (2017) BedMachine v3: Complete Bed Topography and Ocean Bathymetry Mapping
14 of Greenland From Multibeam Echo Sounding Combined With Mass Conservation. *Geophysical Research Letters*,
15 44(21), 11051–11061, ISSN 00948276 (doi: 10.1002/2017GL074954)

Table 1. Ice thickness along the center flowlines of Upernivik glaciers from BedMachine v3 (Morlighem and others, 2017), and calculated stress-coupling lengths (SCL) based on theoretical relationship with ice thickness (H): $SCL = \alpha H$ where α is likely to be between 2, 5.4 or up to 10 times the ice thickness. All units are km.

| Dist. | UI-1 | | | | UI-2 | | | | UI-3 | | | |
|-------|------|------|------|-------|------|------|------|-------|------|------|------|------|
| | H | 2H | 5.4H | 10H | H | 2H | 5.4H | 10H | H | 2H | 5.4H | 10H |
| 1 | 0.78 | 1.56 | 4.22 | 7.82 | 0.70 | 1.40 | 3.79 | 7.02 | 0.70 | 0.97 | 2.62 | 4.86 |
| 2 | 0.79 | 1.58 | 4.27 | 7.90 | 0.68 | 1.36 | 3.67 | 6.79 | 0.68 | 1.01 | 2.73 | 5.05 |
| 3 | 0.80 | 1.59 | 4.29 | 7.95 | 0.67 | 1.34 | 3.63 | 6.72 | 0.67 | 1.08 | 2.91 | 5.39 |
| 4 | 0.75 | 1.51 | 4.07 | 7.53 | 0.69 | 1.38 | 3.74 | 6.92 | 0.69 | 1.13 | 3.04 | 5.63 |
| 5 | 0.75 | 1.49 | 4.03 | 7.47 | 0.72 | 1.44 | 3.89 | 7.21 | 0.72 | 1.16 | 3.14 | 5.81 |
| 6 | 0.75 | 1.49 | 4.03 | 7.47 | 0.74 | 1.48 | 4.01 | 7.42 | 0.74 | 1.16 | 3.13 | 5.80 |
| 7 | 0.76 | 1.52 | 4.11 | 7.61 | 0.74 | 1.48 | 3.99 | 7.39 | 0.74 | 1.17 | 3.16 | 5.84 |
| 8 | 0.80 | 1.59 | 4.29 | 7.95 | 0.72 | 1.44 | 3.90 | 7.22 | 0.72 | 1.20 | 3.23 | 5.98 |
| 9 | 0.83 | 1.67 | 4.51 | 8.35 | 0.71 | 1.42 | 3.84 | 7.11 | 0.71 | 1.24 | 3.35 | 6.21 |
| 10 | 0.87 | 1.73 | 4.68 | 8.66 | 0.72 | 1.44 | 3.90 | 7.21 | 0.72 | 1.30 | 3.51 | 6.50 |
| 11 | 0.94 | 1.87 | 5.06 | 9.36 | 0.72 | 1.45 | 3.91 | 7.24 | 0.72 | 1.31 | 3.55 | 6.57 |
| 12 | 1.00 | 1.99 | 5.37 | 9.95 | 0.74 | 1.48 | 4.01 | 7.42 | 0.74 | 1.32 | 3.58 | 6.62 |
| 13 | 1.03 | 2.06 | 5.57 | 10.32 | 0.77 | 1.54 | 4.15 | 7.68 | 0.77 | 1.37 | 3.71 | 6.87 |
| 14 | 1.06 | 2.12 | 5.73 | 10.61 | 0.81 | 1.61 | 4.35 | 8.05 | 0.81 | 1.37 | 3.70 | 6.86 |
| 15 | 1.09 | 2.17 | 5.87 | 10.87 | 0.84 | 1.68 | 4.52 | 8.38 | 0.84 | 1.41 | 3.82 | 7.07 |
| 16 | 1.12 | 2.25 | 6.07 | 11.23 | 0.88 | 1.77 | 4.77 | 8.83 | 0.88 | 1.48 | 4.00 | 7.41 |
| 17 | 1.12 | 2.25 | 6.07 | 11.24 | 0.94 | 1.88 | 5.08 | 9.41 | 0.94 | 1.52 | 4.11 | 7.61 |
| 18 | 1.14 | 2.29 | 6.17 | 11.43 | 0.99 | 1.99 | 5.36 | 9.93 | 0.99 | 1.58 | 4.28 | 7.92 |
| 19 | 1.16 | 2.32 | 6.27 | 11.61 | 1.05 | 2.10 | 5.66 | 10.48 | 1.05 | 1.65 | 4.46 | 8.26 |
| 20 | 1.19 | 2.37 | 6.41 | 11.86 | 1.09 | 2.18 | 5.89 | 10.90 | 1.09 | 1.69 | 4.57 | 8.46 |

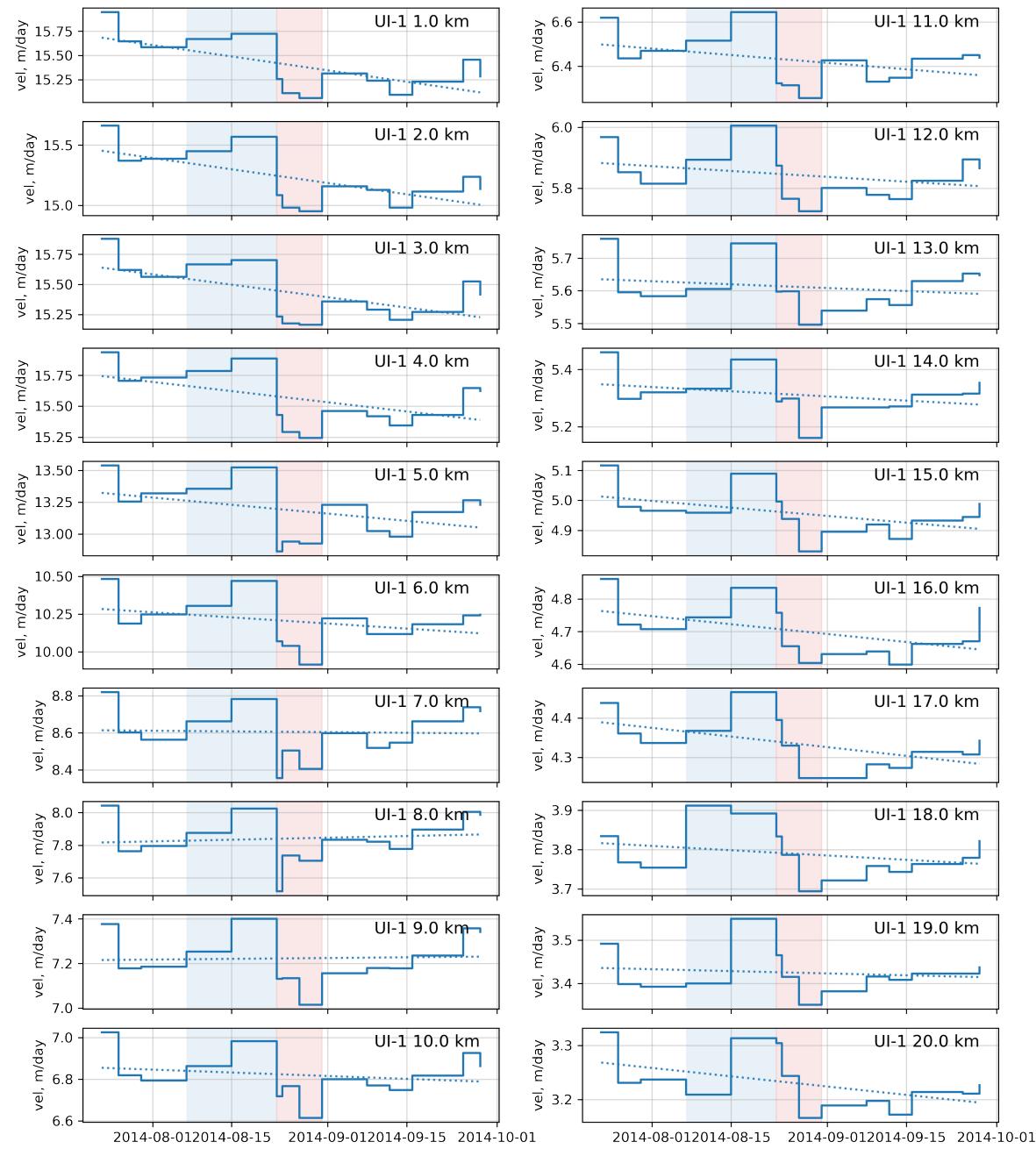


Fig. 1. COSMO-SkyMed-derived velocity at ten points along the center flow line of UI-1

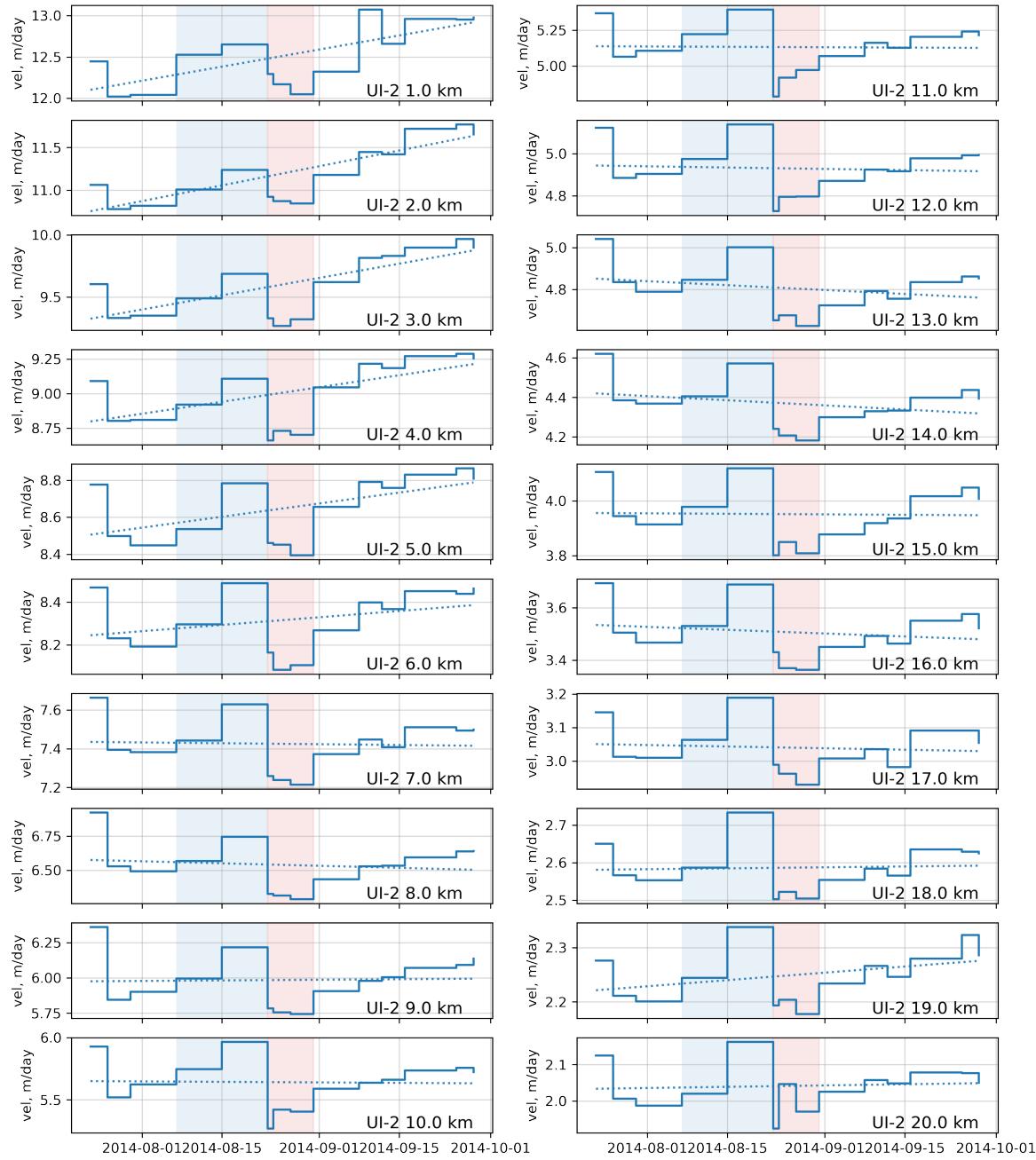


Fig. 2. COSMO-SkyMed-derived velocity at ten points along the center flow line of UI-2

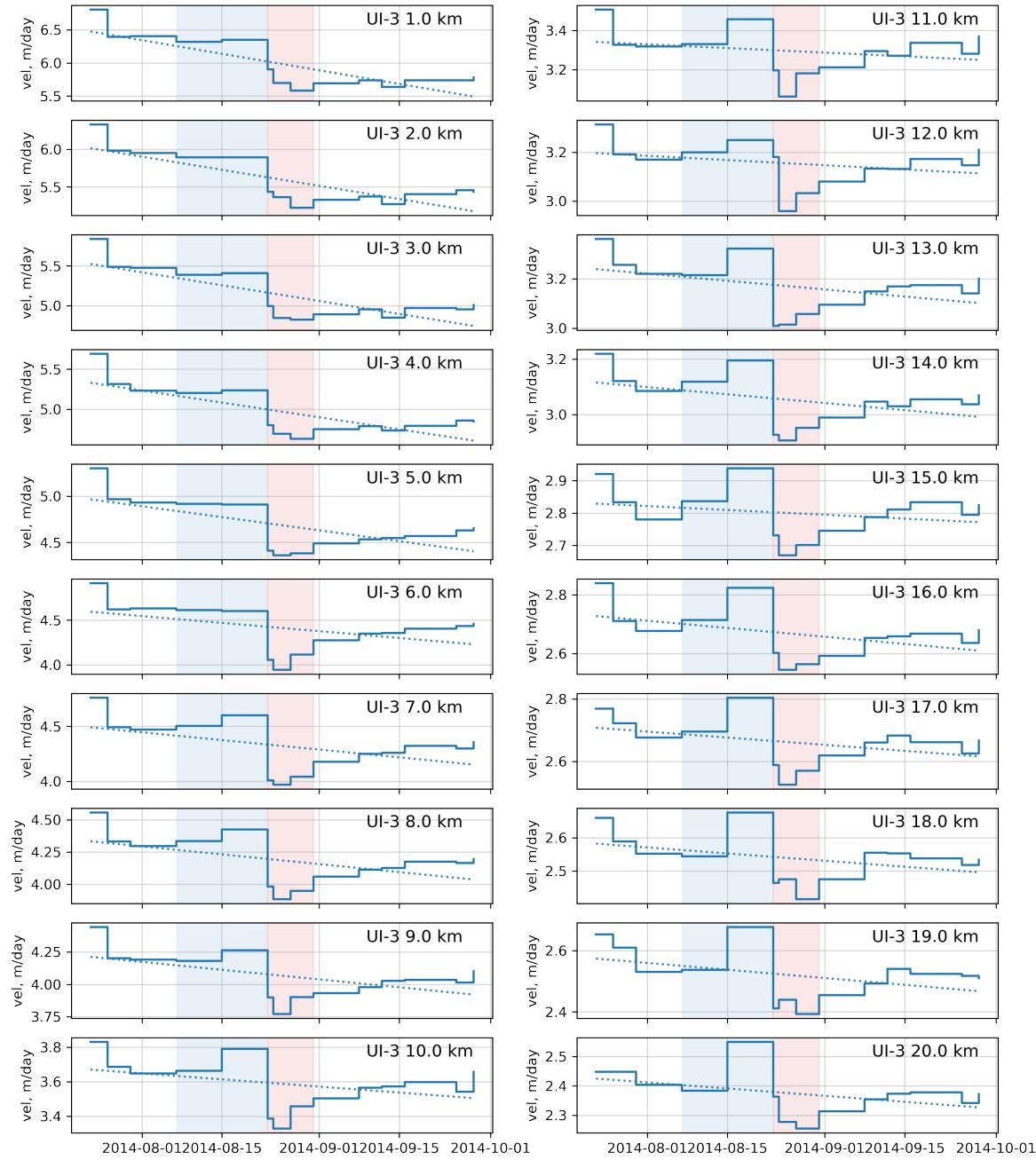


Fig. 3. COSMO-SkyMed-derived velocity at ten points along the center flow line of UI-3

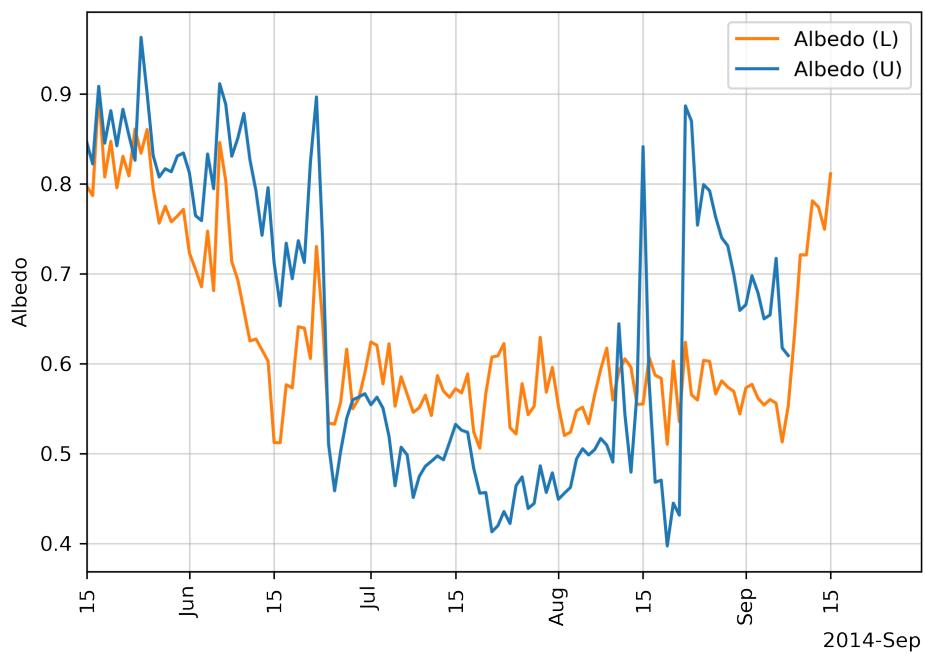


Fig. 4. Albedo at the two PROMICE weather stations, UPE_L (L) and UPE_U (U).

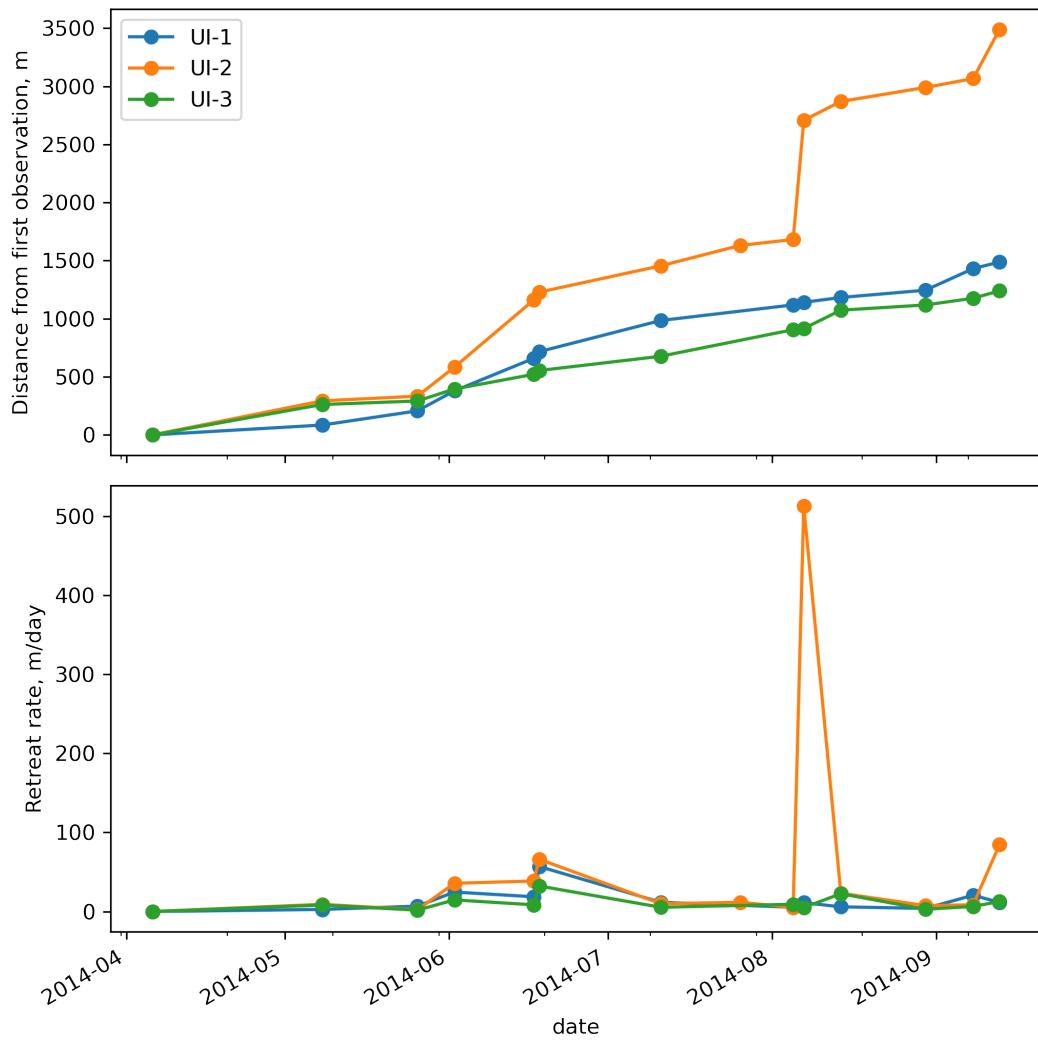


Fig. 5. Calving front retreat along center flow lines. Upper: total distance from first observation on 6 April, 2014. Lower: average retreat rate in m/day between observations.