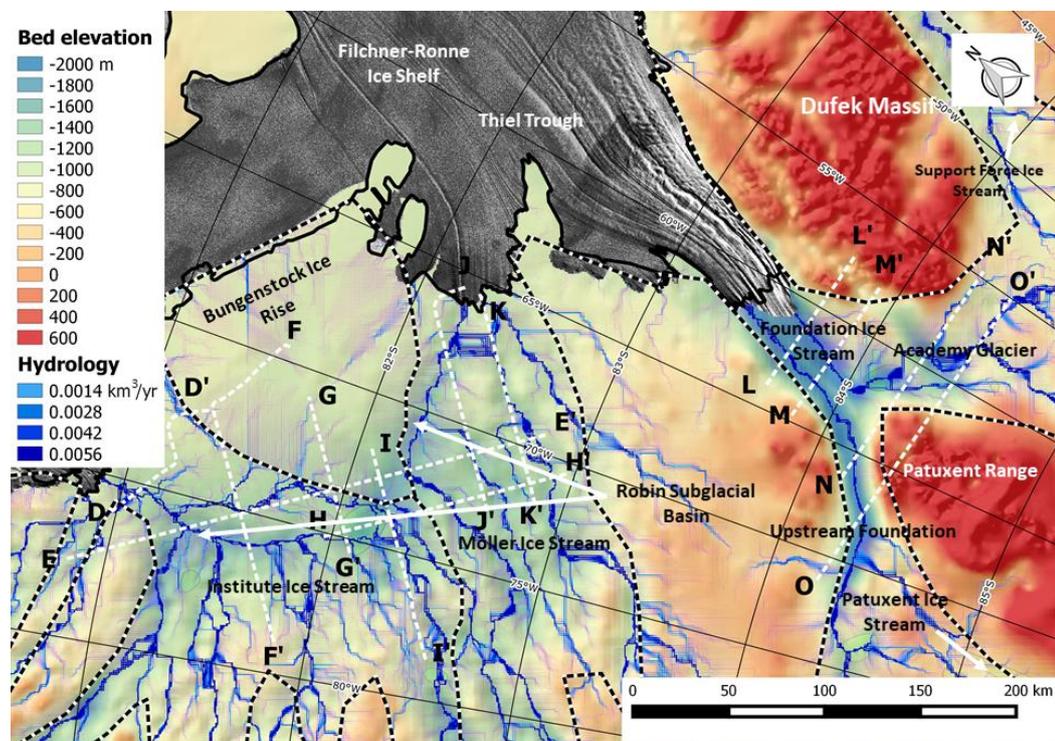


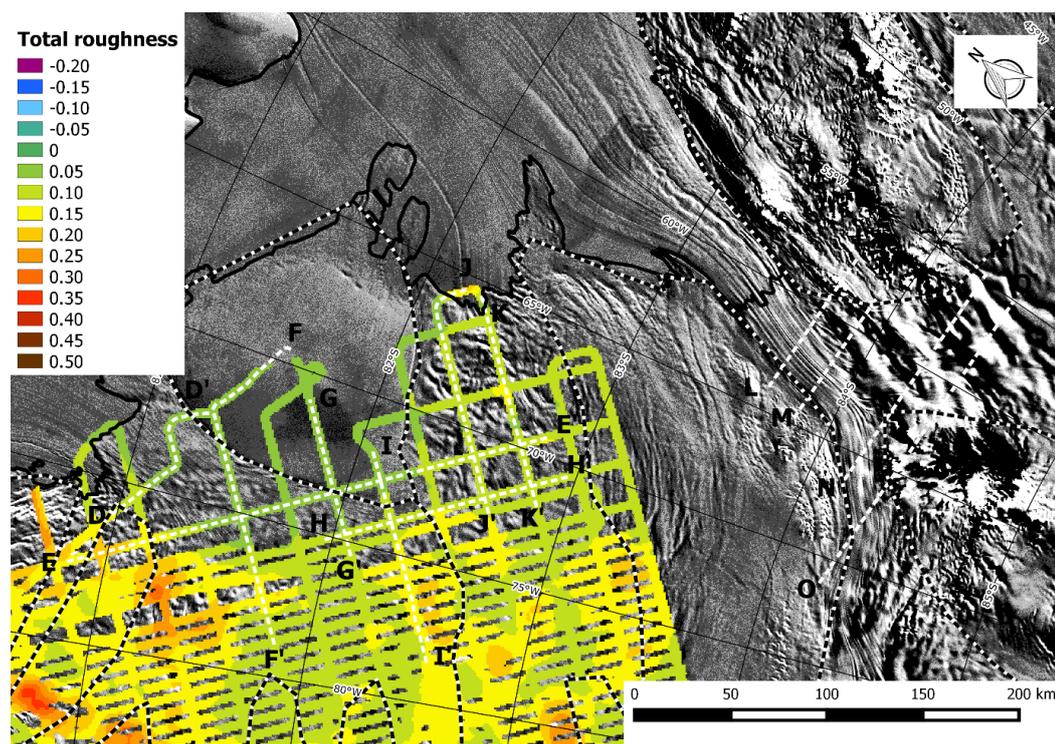
# SUPPLEMENTARY INFORMATION: Comparing numerical ice-sheet model output with radio-echo sounding measurements in the Weddell Sea sector of West Antarctica

HAFEEZ JOEFRY, NEIL ROSS AND MARTIN J. SIEGERT

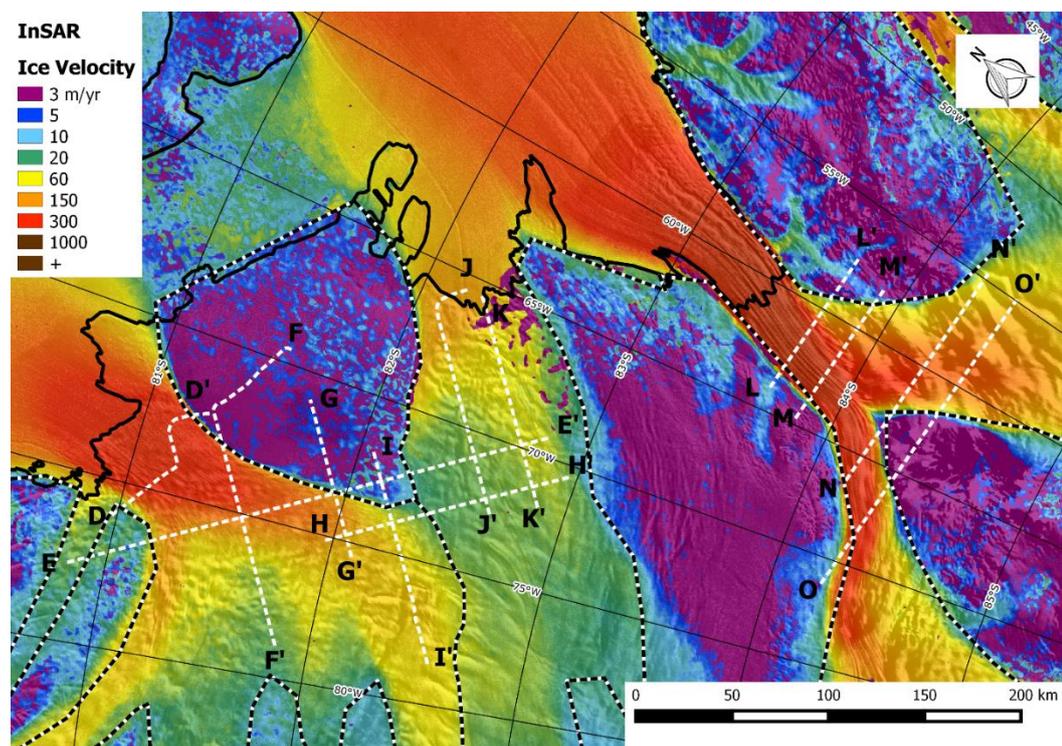
Supplementary Figure 1a



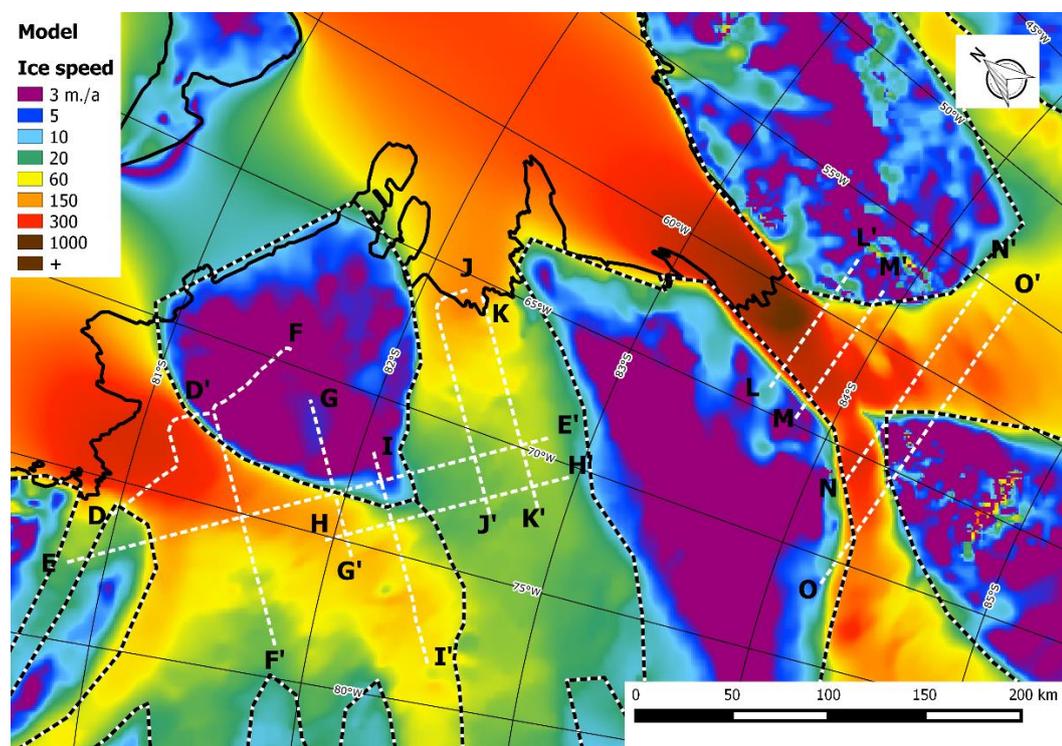
Supplementary Figure 1b



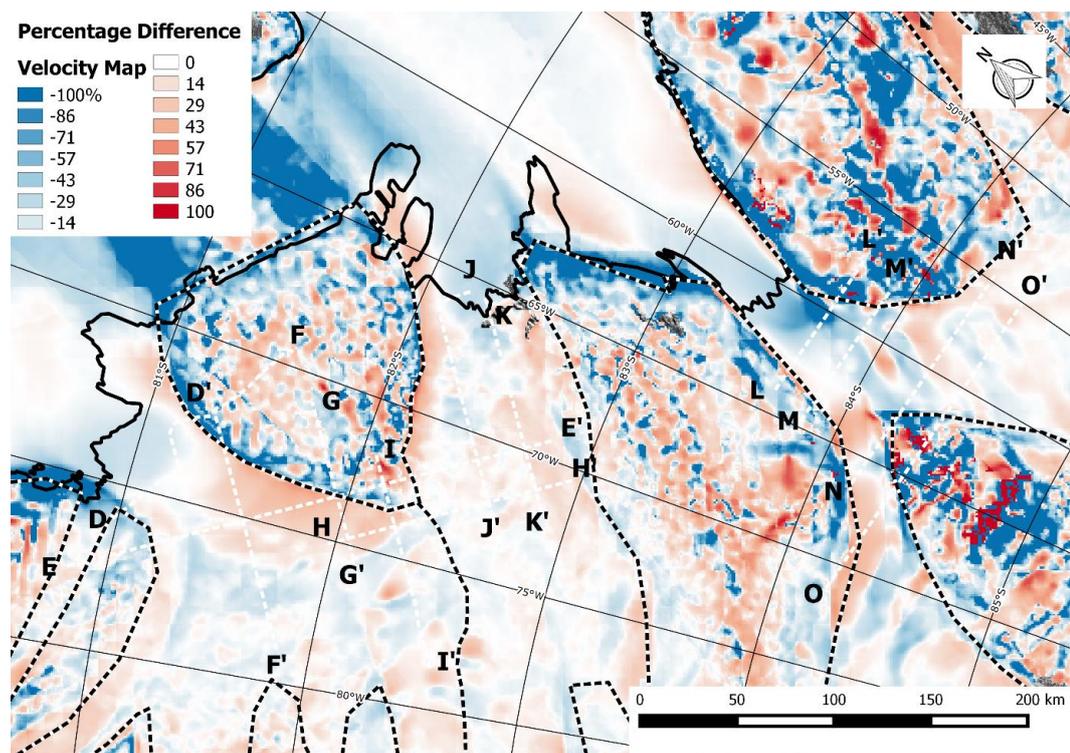
Supplementary Figure 1c



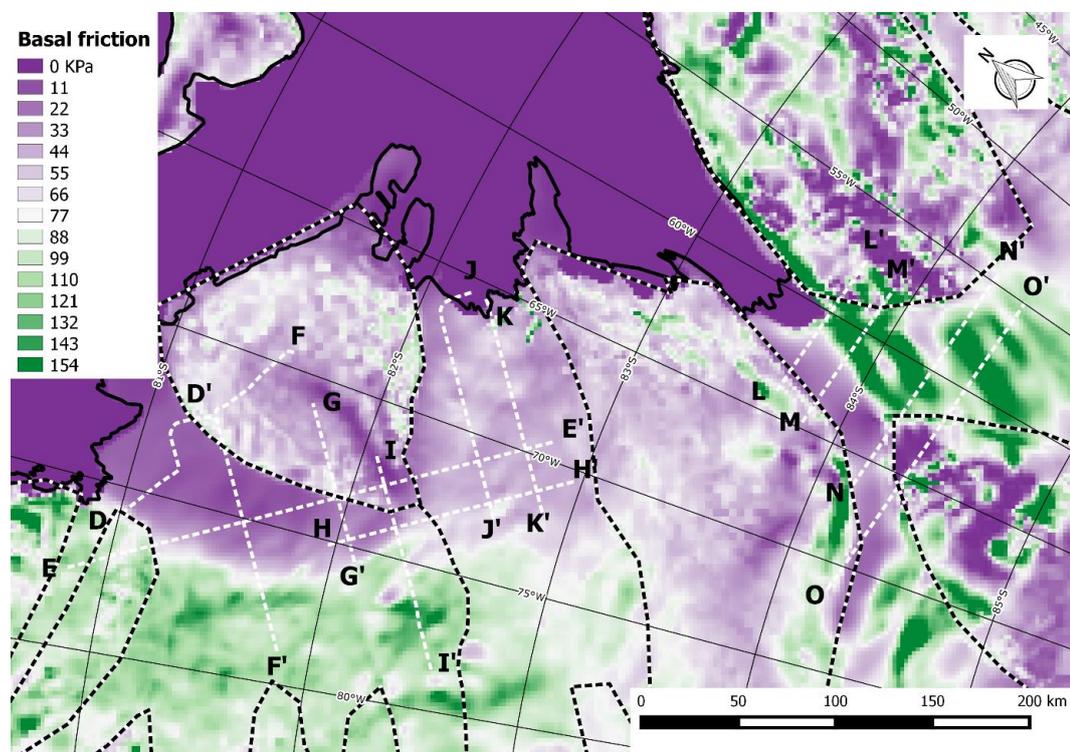
Supplementary Figure 1d



Supplementary Figure 1e

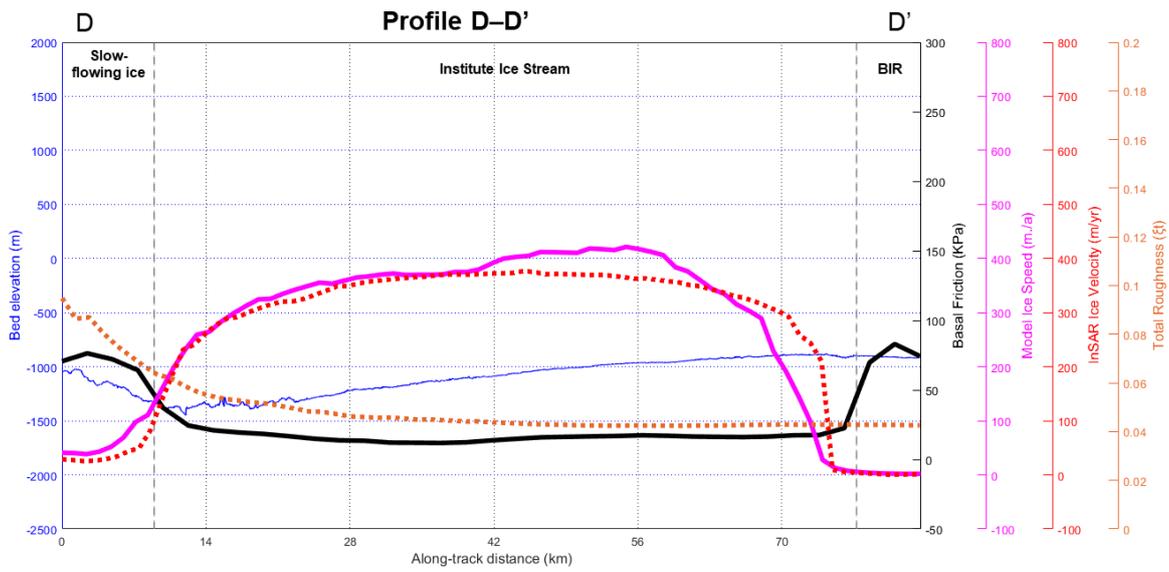


Supplementary Figure 1f

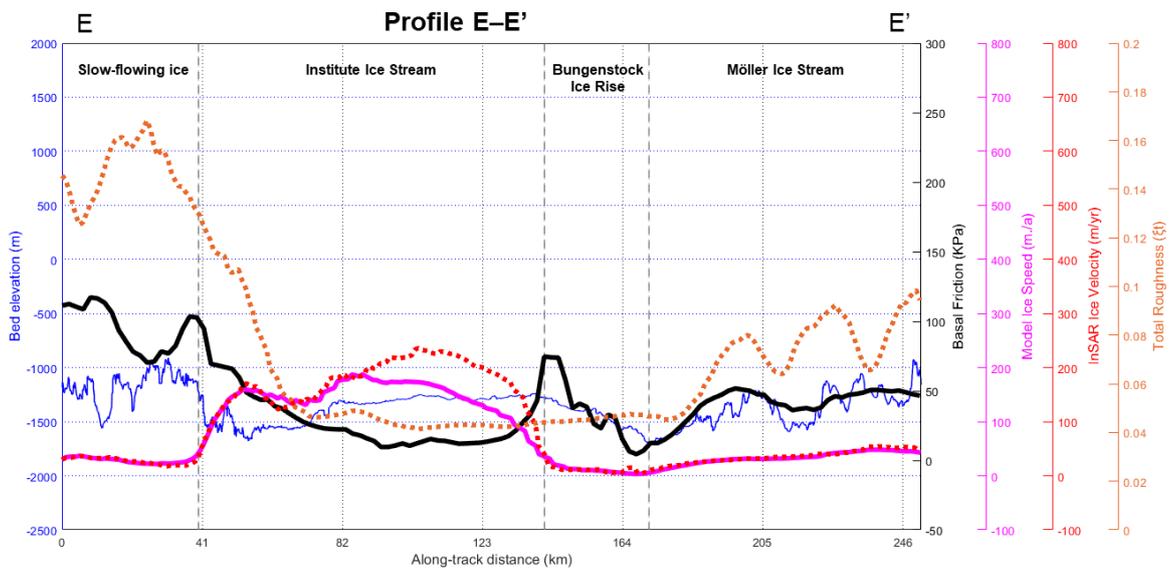


**Supplementary Figure 1:** Map of the Weddell Sea (WS) sector encompassing the Institute Ice Stream, Möller Ice Stream and Foundation Ice Stream; (a) The bed elevation DEM with 500 m resolution (Jeofry and others, 2018a), with subglacial hydrological pathways (blue lines) and locations of subglacial lakes (green polygons) distributed across this region superimposed over the DEM (Jeofry and others, 2018b). RES survey lines discussed (in main text and SI) are indicated by white dashed line; (b) the total roughness index of the IMAFI survey (Rippin et al., 2014); (c) InSAR-based ice velocity map version 2 (Rignot et al., 2017), a, b and c are superimposed over MODIS satellite imagery (Haran et al., 2014); (d) BISICLES modelled ice speed; (e) percentage difference between measured and modelled surface ice velocity (positive values are where measurements exceed the model values); and (f) basal friction estimated by the ice-sheet model inversion. RES transects, annotated in Figure 2, are shown. The black line denotes the boundary of grounded and floating ice, whereas black/white dotted line denotes the margin of Institute, Möller and Foundation Ice Streams.

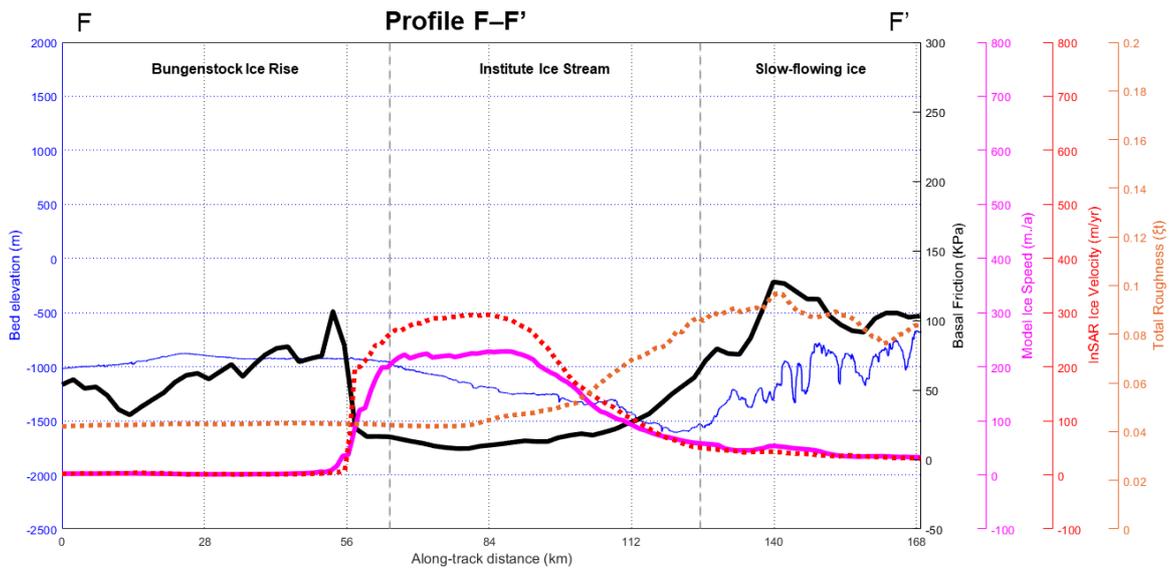
Supplementary Figure 2a



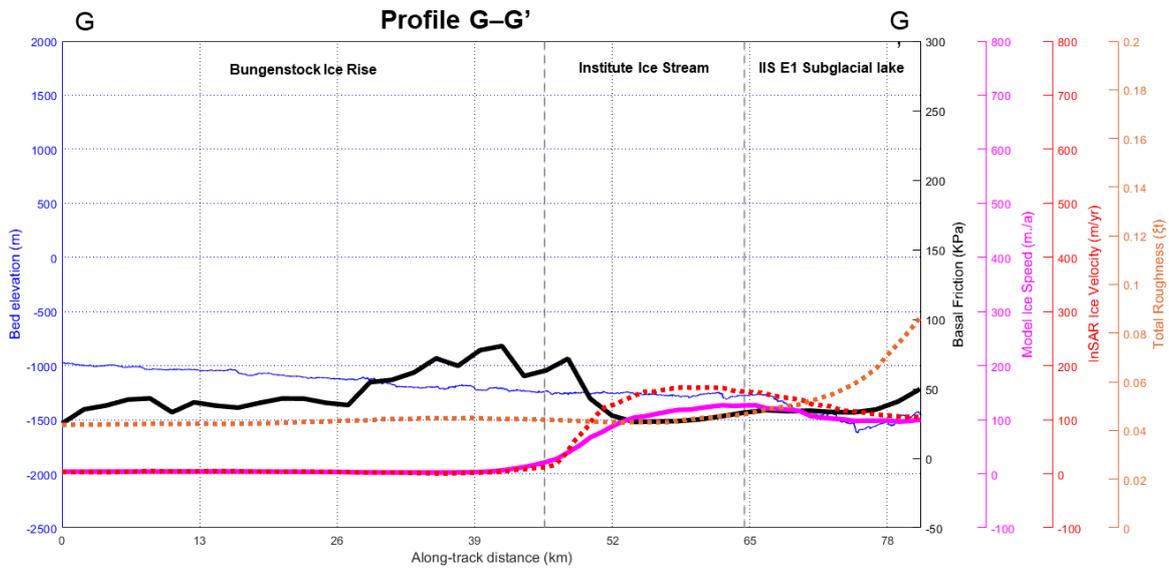
Supplementary Figure 2b



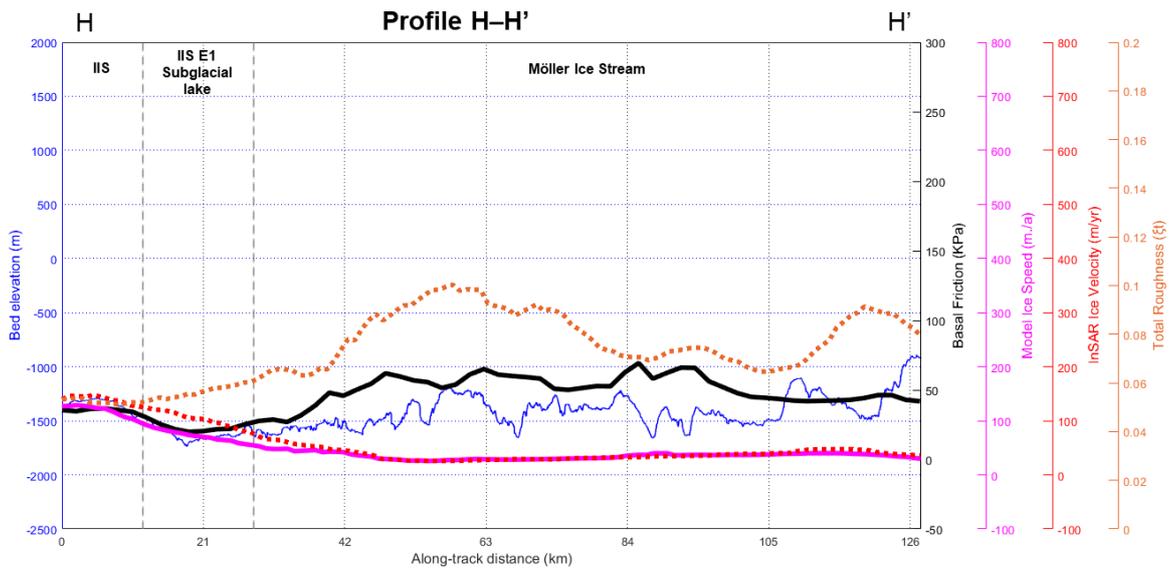
Supplementary Figure 2c



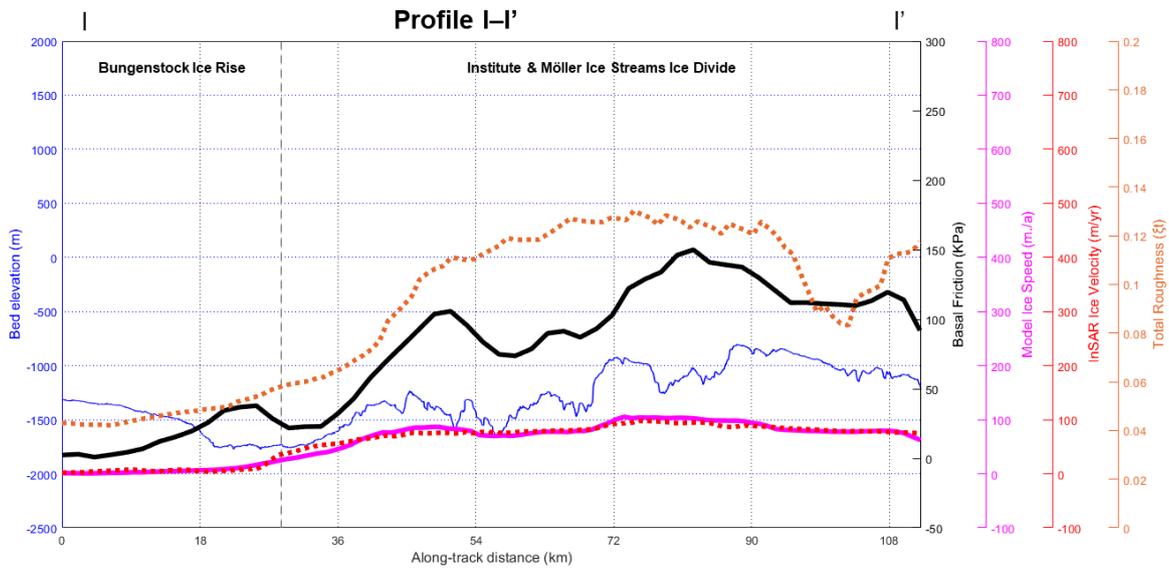
Supplementary Figure 2d



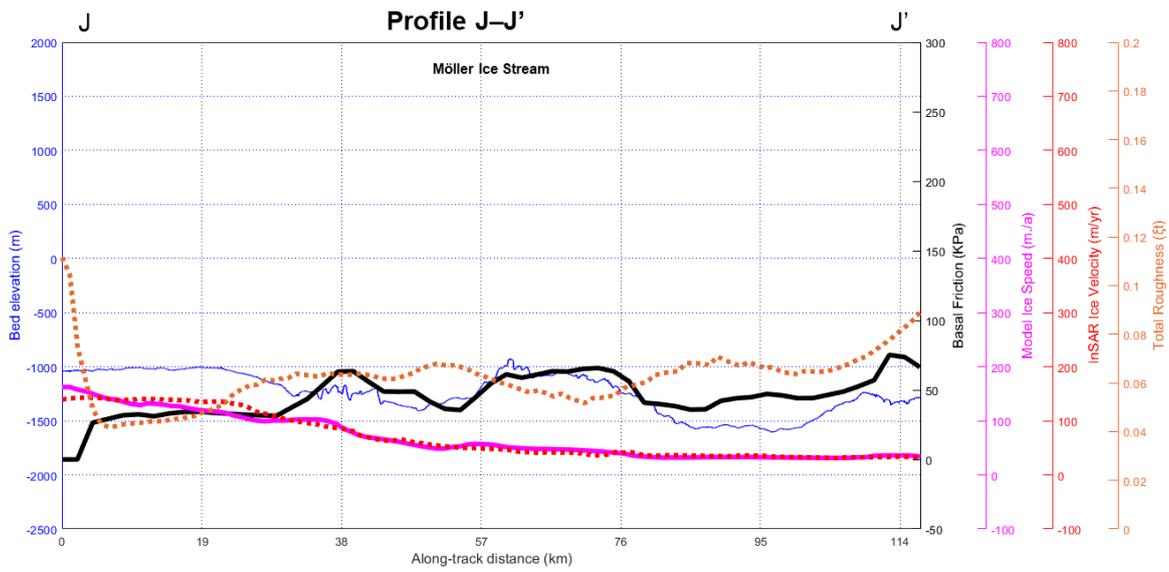
Supplementary Figure 2e



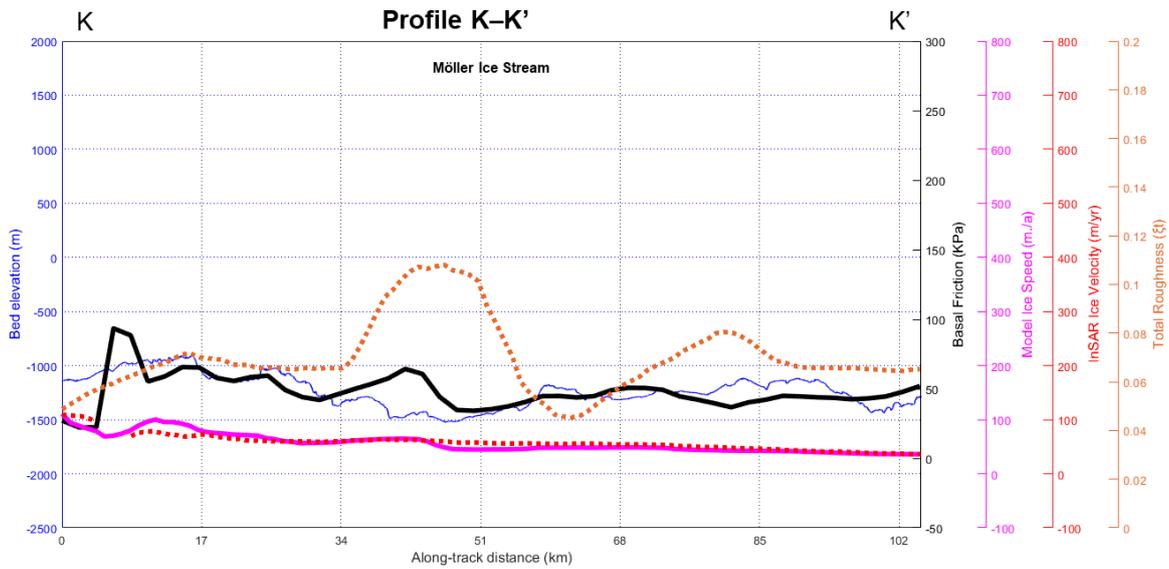
Supplementary Figure 2f



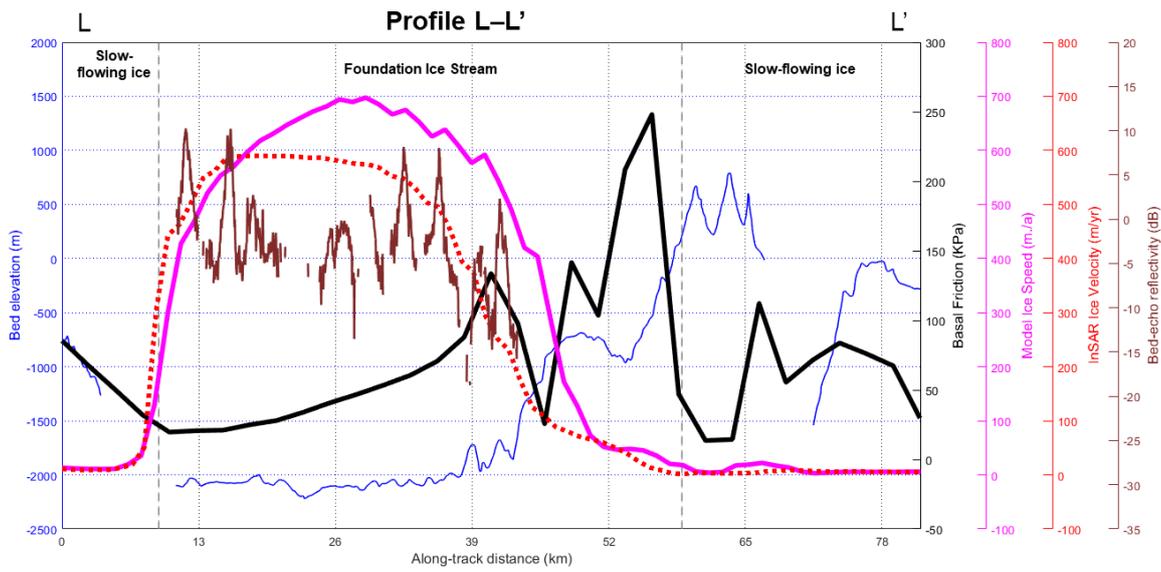
Supplementary Figure 2g



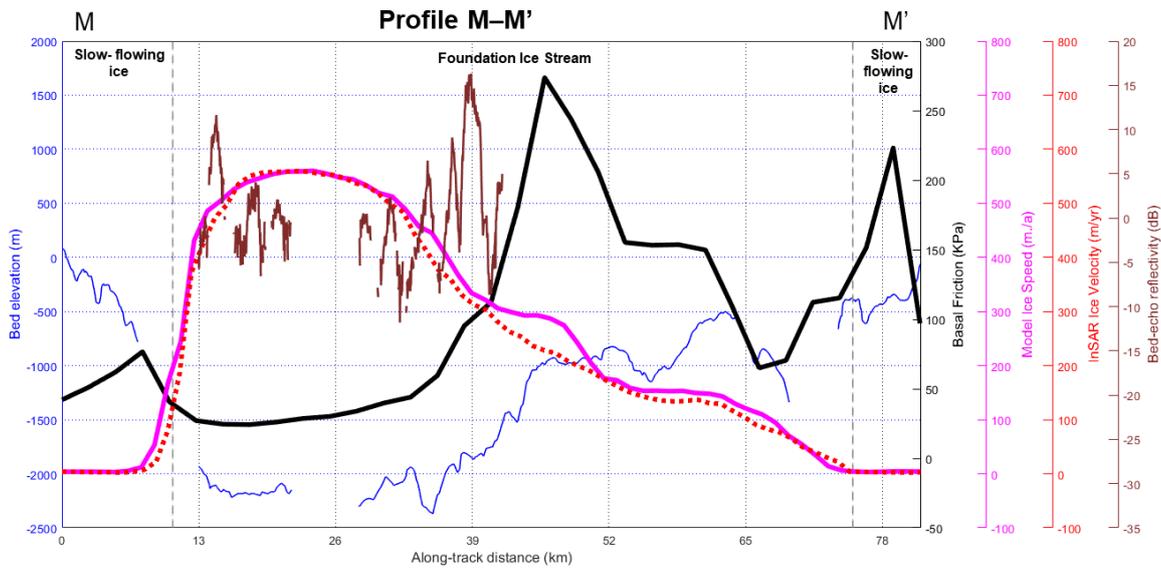
Supplementary Figure 2h



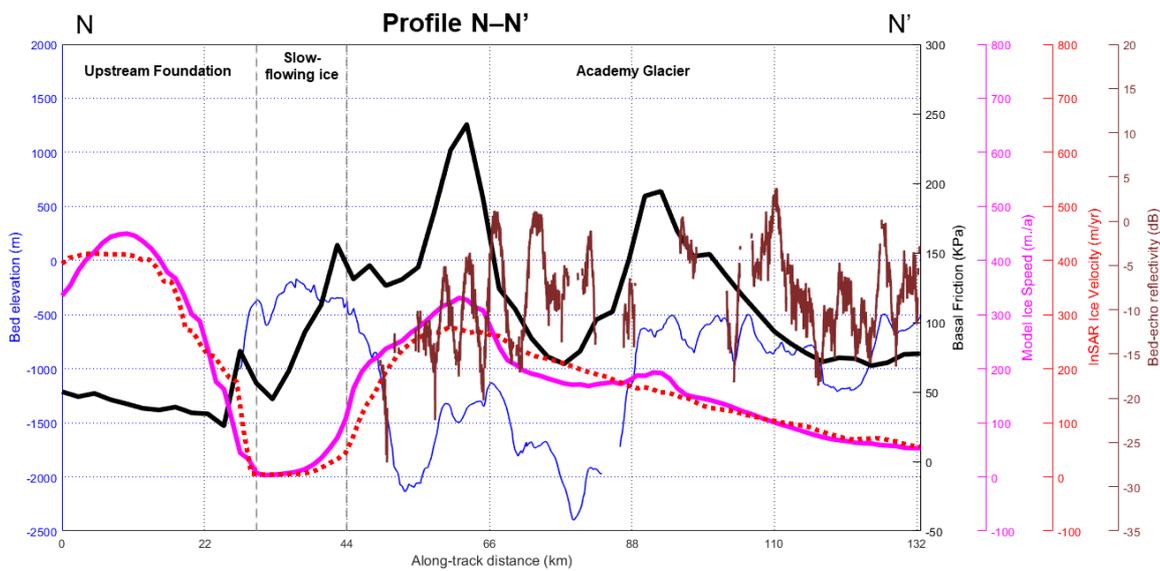
Supplementary Figure 2i



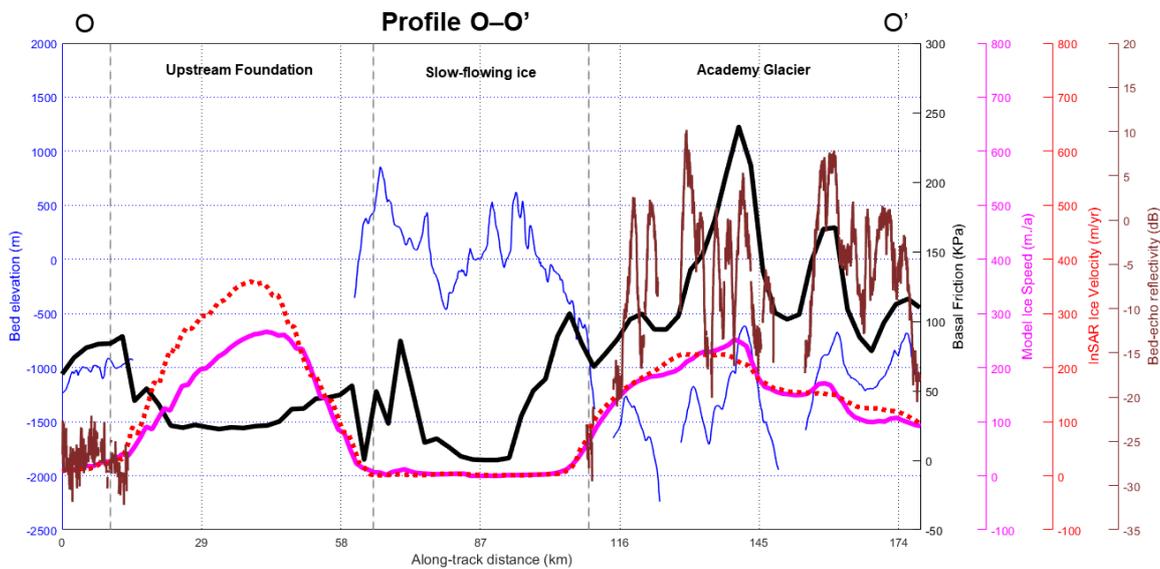
Supplementary Figure 2j



Supplementary Figure 2k



Supplementary Figure 2l



Supplementary Figure 2: RES transects revealing the comparison between geophysical data and modelling outputs; a. D-D', b. E-E', c. F-F', d. G-G', e. H-H', f. I-I', g. J-J', h. K-K', i. L-L', j. M-M', k. N-N' and l. O-O', as located in Figure 1. Methods used to calculate bed-echo reflectivity are given in Jeofry and others (2018b).

## REFERENCES

- JEOFRY, H., ROSS, N., CORR, H. F., LI, J., MORLIGHEM, M., GOGINENI, P. & SIEGERT, M. J. 2018a. A new bed elevation model for the Weddell Sea sector of the West Antarctic Ice Sheet. *Earth System Science Data*, 10, 711-725.
- JEOFRY, H., ROSS, N., LE BROCCQ, A., GRAHAM, A. G. C., LI, J., GOGINENI, P., MORLIGHEM, M., JORDAN, T. & SIEGERT, M. J. 2018b. Hard rock landforms generate 130 km ice shelf channels through water focusing in basal corrugations. *Nature Communications*, 9, 4576.
- RIPPIN, D., BINGHAM, R., JORDAN, T., WRIGHT, A., ROSS, N., CORR, H., FERRACCIOLI, F., LE BROCCQ, A., ROSE, K. & SIEGERT, M. 2014. Basal roughness of the Institute and Möller Ice Streams, West Antarctica: Process determination and landscape interpretation. *Geomorphology*, 214, 139-147.
- HARAN, T., BOHLANDER, J., SCAMBOS, T., PAINTER, T. & FAHNESTOCK, M. 2014. MODIS Mosaic of Antarctica 2008–2009 (MOA2009) Image Map. *Boulder, Colorado USA: National Snow and Ice Data Center, doi*, 10, N5KP8037.
- RIGNOT, E., MOUGINOT, J. & SCHEUCHL, B. 2017. MEaSURES InSAR-Based Antarctica Ice Velocity Map, Version 2. *National Snow and Ice Data Center: Boulder, CO, USA*. <https://doi.org/10.5067/D7GK8F5J8M8R>