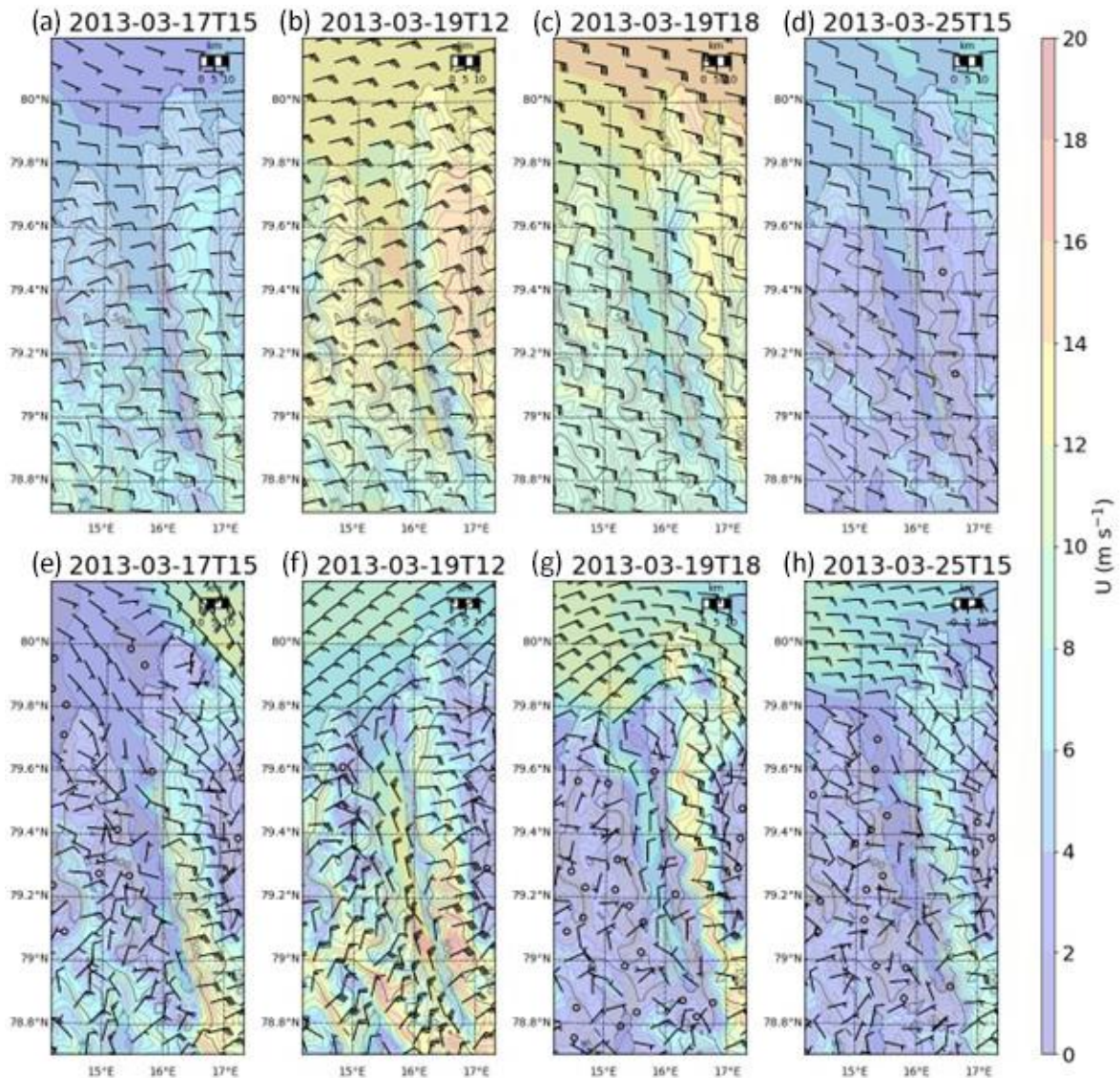
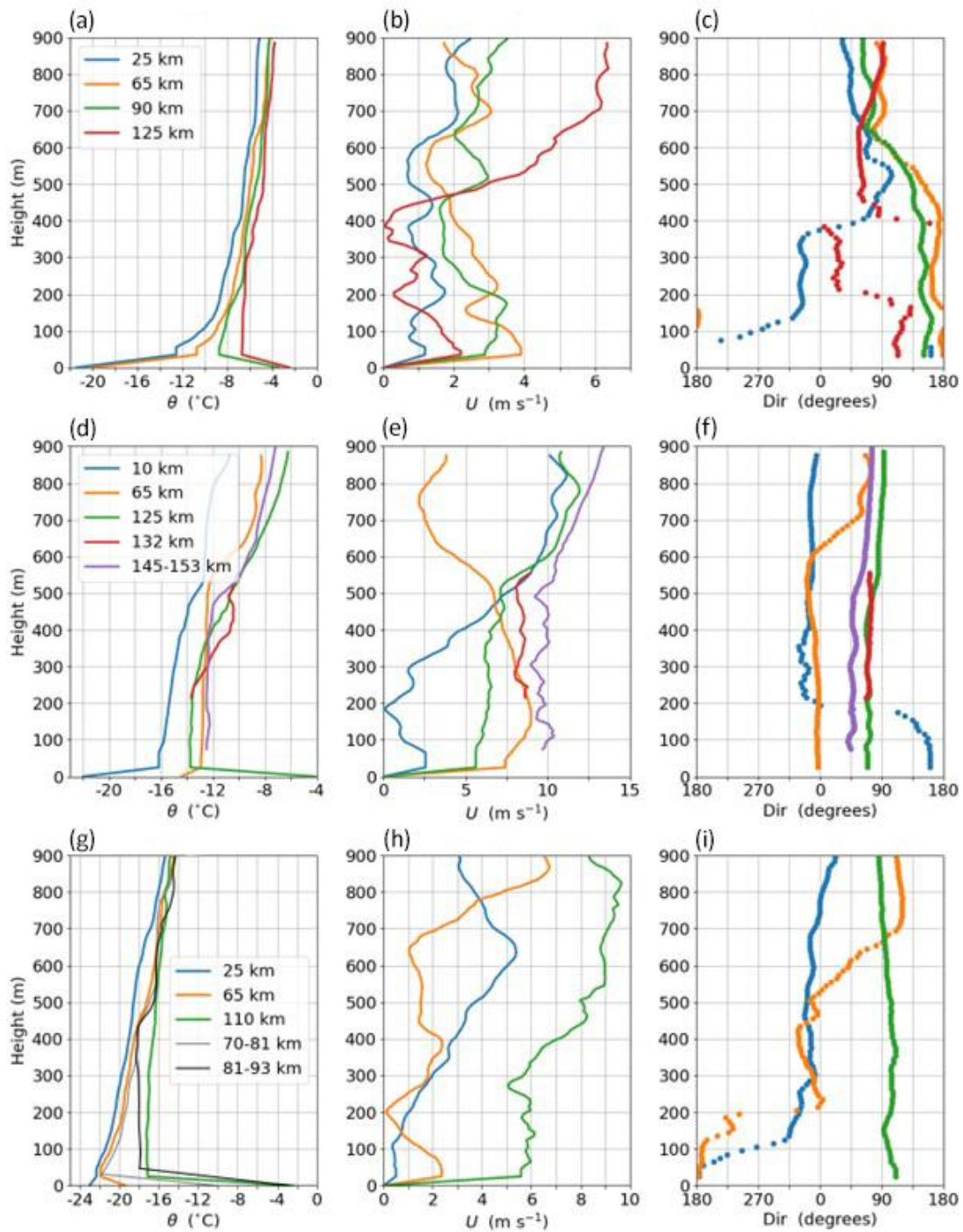


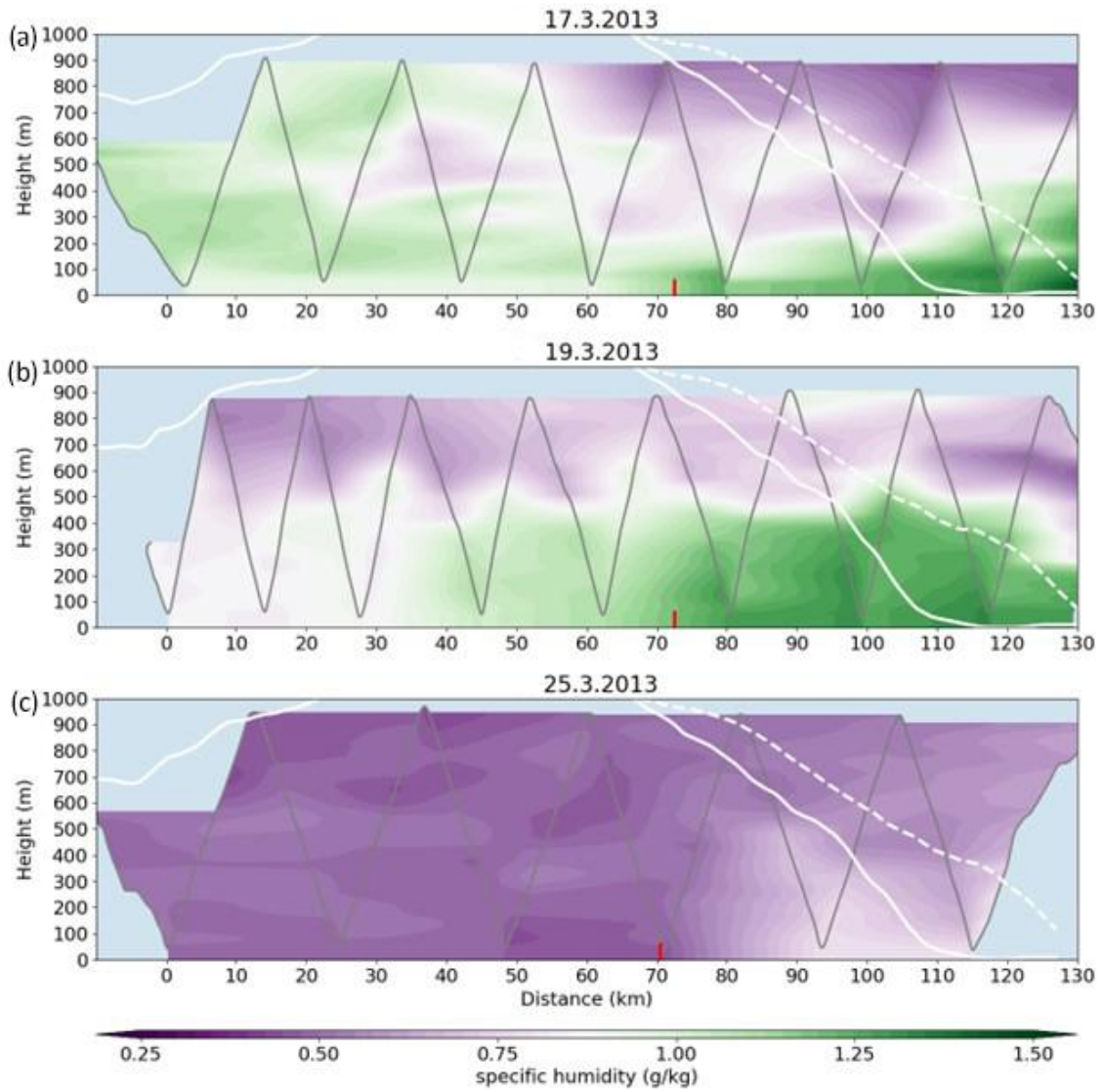
**Supplementary material for:** Suomi I., Vihma T., Nygård T., Hartmann J. & Lüpkes C. 2025. Mesoscale atmospheric processes over an Arctic fjord as observed during a research aircraft campaign in winter. *Polar Research* 44. Correspondence: I. Suomi, Finnish Meteorological Institute, P.O. Box 503, FI-00101 Helsinki, Finland. E-mail: irene.e.suomi@gmail.com



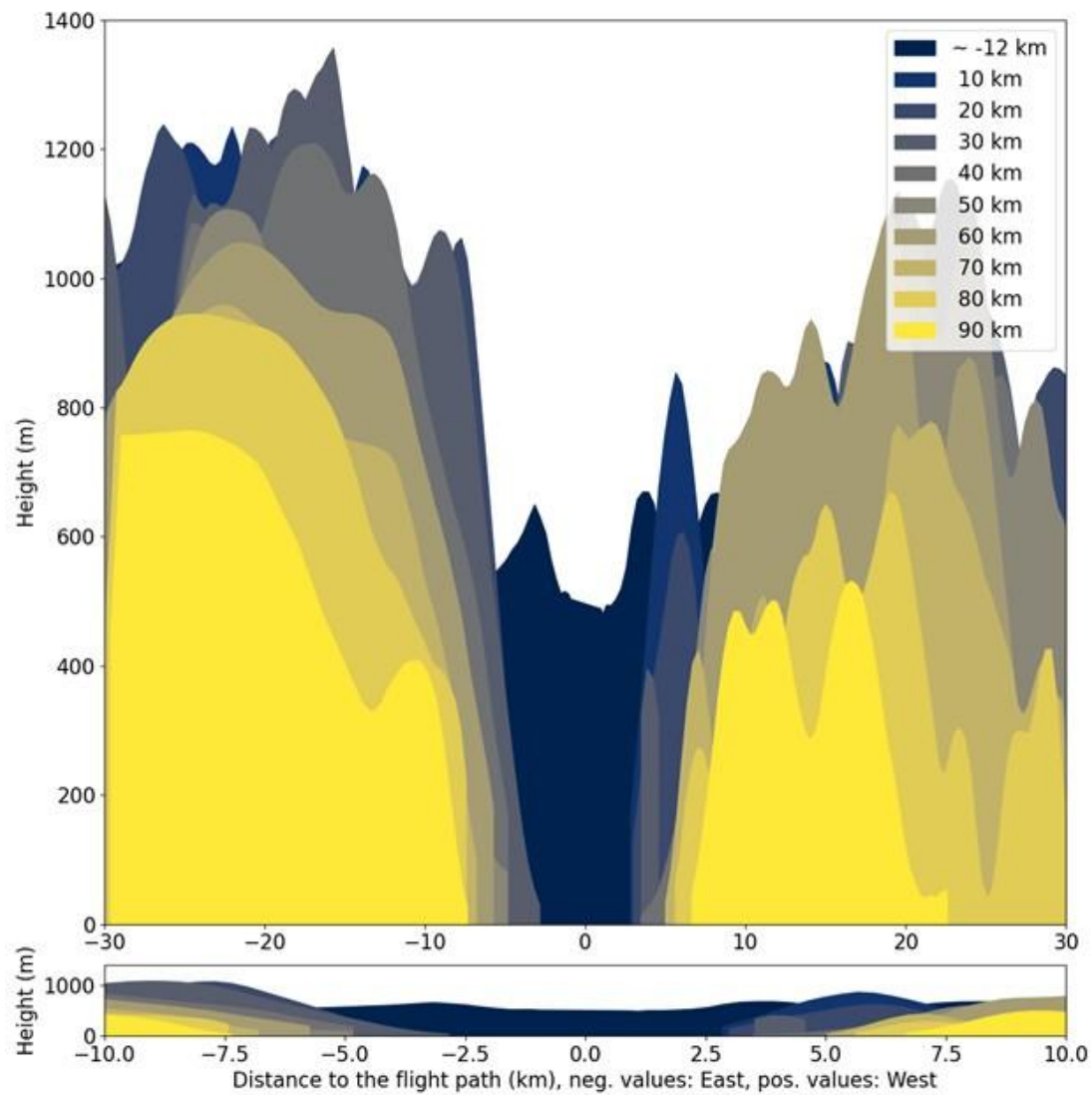
**Supplementary Fig. S1.** Wind speed (colours) and vector winds (barbs) at (a-d) 850 hPa level and (e-h) at the second lowest model level, 64, based on CARRA (a, e) on 17 March at 15:00 UTC, (b, f) 19 March 2013 at 12:00, (c, g) 19 March at 18:00 and (d, h) 25 March at 15:00. Light grey contours show the topography of the land areas from CARRA.



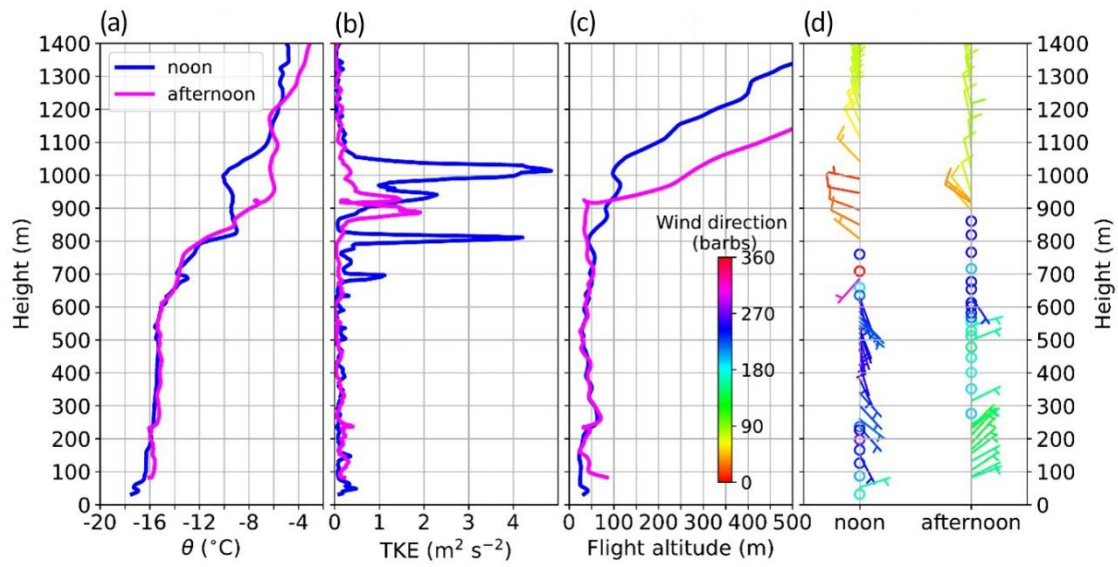
**Supplementary Fig. S2.** Profiles of (a, d, g) potential temperature, (b, e, h) absolute value of horizontal wind speed and (c, f, i) wind direction extracted from the distance–height cross-sections based on saw-tooth pattern flights on (a-c) 17 (Fig. 6), (d-f) 19 (Fig. 3) and (g-i) 25 (Fig. 7) March 2013. In (d-f), the profiles at distances of 145–153 km from the fjord head are extracted from a separate flight during 12:05–12:08 UTC north of the fjord. The profiles in (g-i) at 70–81 km and 81–93 km are based on data along the flight path of the saw-tooth pattern.



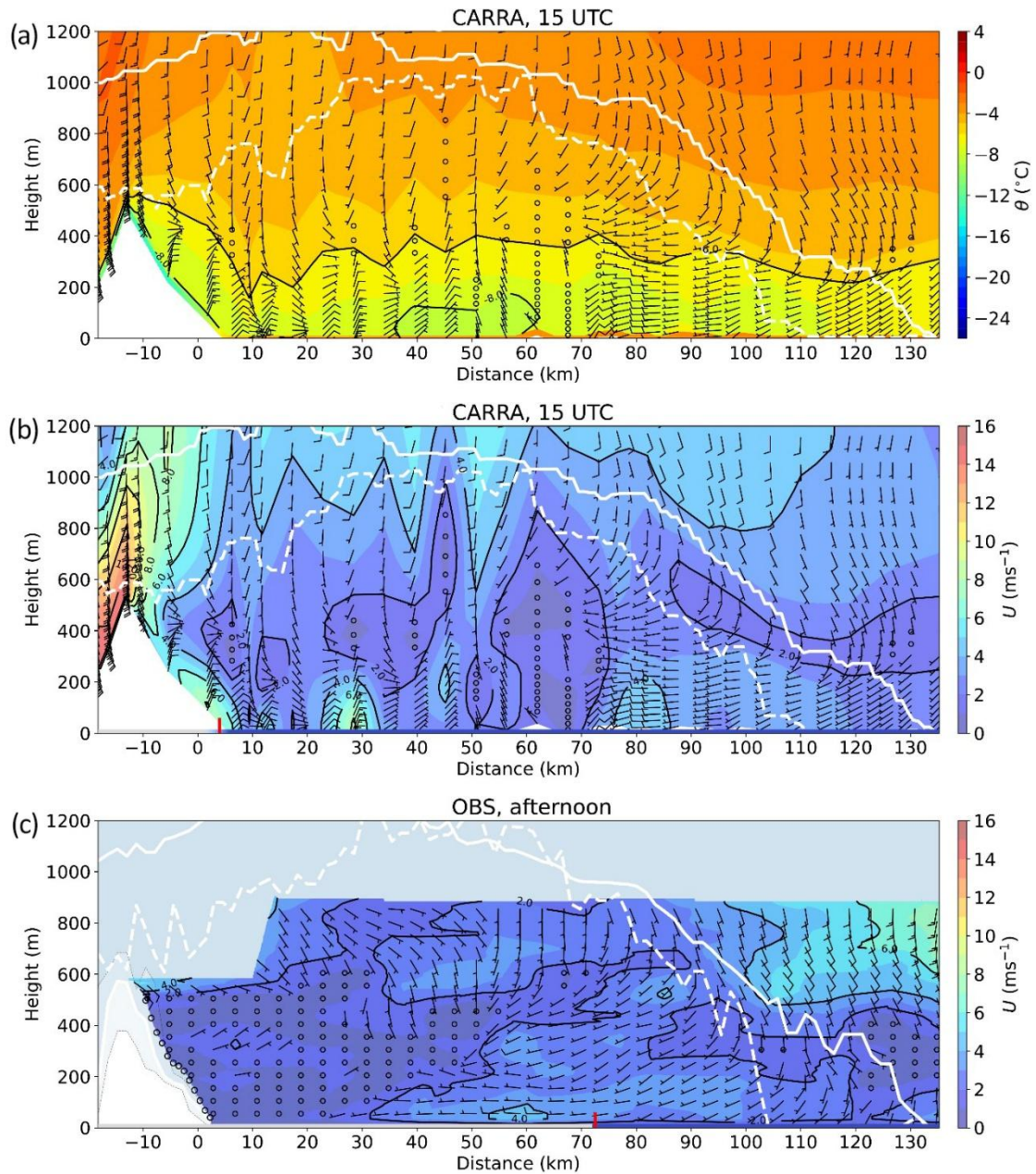
**Supplementary Fig. S3.** Distance–height cross-sections of specific humidity based on saw-tooth pattern flights on (a) 17, (b) 19 and (c) 25 March 2013. The maximum terrain elevations on the western/eastern sides of the fjord are shown by solid/dashed lines. The location of the ice edge is indicated by a red vertical line at 72.5 km north of the fjord head.



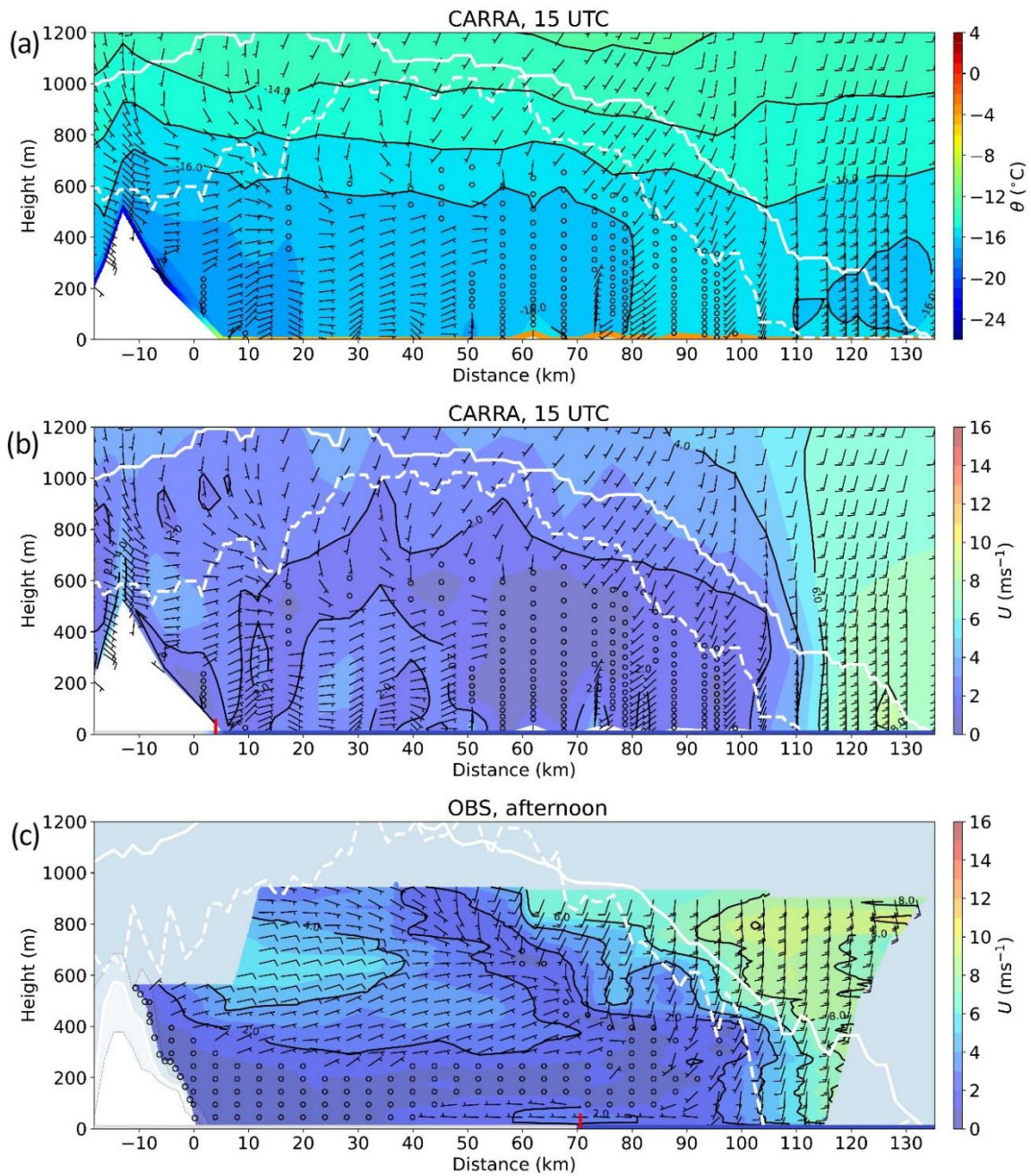
**Supplementary Fig. S4.** Terrain profile in a lateral direction at different distances from the fjord head. The lower panel shows the same as the upper panel, but the height scales with the horizontal distance in an east–west direction. The zero point on the horizontal axis is the location of the saw-tooth pattern flight. The profile at distance -12 km represents the maximum terrain elevation south of the fjord, centred at the reference point in the fjord head. Data are from Amante & Eakins (2009).



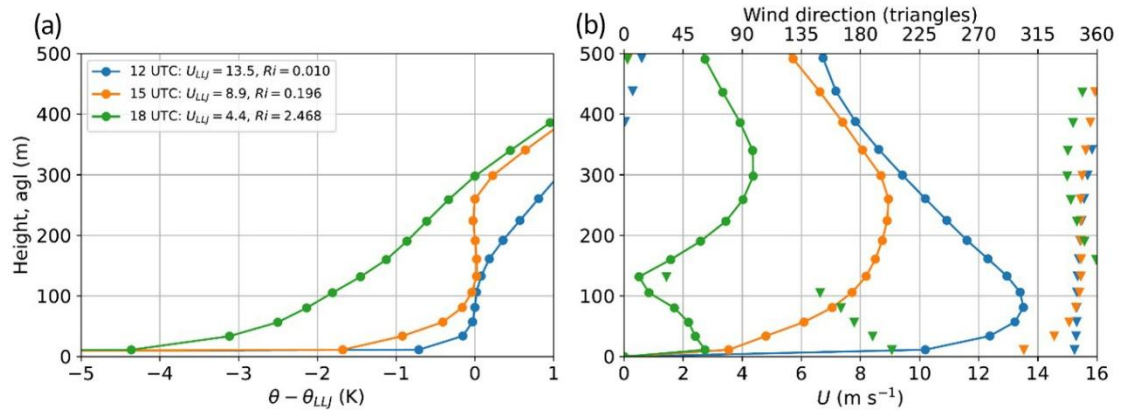
**Supplementary Fig. S5.** Profiles of (a) potential temperature, (b) TKE, (c) flight altitude above the local surface and (d) wind barbs over the Mittag-Lefflerbreen glacier south-east of the fjord head at noon and in the afternoon. The wind barb colours represent wind direction.



**Supplementary Fig. S6.** Distance–height cross-sections of (a) potential temperature, (b, c) wind speed and (a-c) wind barbs based on (a, b) CARRA reanalyses on 17 March 2013 at 15:00 UTC and (c) observations, also shown in Fig. 9. The surface type—ice/snow (grey) or water (blue)—is shown by the horizontal line at the bottom of each panel. Maximum terrain elevations of the mountains on the eastern/western side of the fjord are shown by solid/dashed white lines. In (a) and (b) they were derived from CARRA, in (c) from Amante & Eakins (2009).



**Supplementary Fig. S7.** Distance–height cross-sections of (a) potential temperature, (b, c) wind speed and (a-c) wind barbs based on (a, b) CARRA reanalyses on 25 March 2013 at 15:00 UTC and (c) observations, also shown in Fig. 10. The surface type—ice/snow (grey) or water (blue)—is shown by the horizontal line at the bottom of each panel. Maximum terrain elevations on the mountains on the eastern/western side of the fjord are shown by solid/dashed white lines. In (a) and (b) they were derived from CARRA, in (c) from Amante & Eakins (2009).



**Supplementary Fig. S8.** Temporal evolution of (a) potential temperature and (b) wind speed and direction profiles from CARRA at the grid point located about 5 km south of the fjord head (Fig. 13) on 19 March 2013. The model terrain height at the point is about 230 m.