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Disentangling the impact of air–sea interaction and boundary layer cloud formation on stable water isotope signals in the warm sector of a Southern Ocean cyclone

Iris Thurnherr and Franziska Aemisegger

Correspondence to: Iris Thurnherr (iris.thurnherr@uib.no)

S1 Detailed synoptic situation and trajectory evolution during warm advection case study

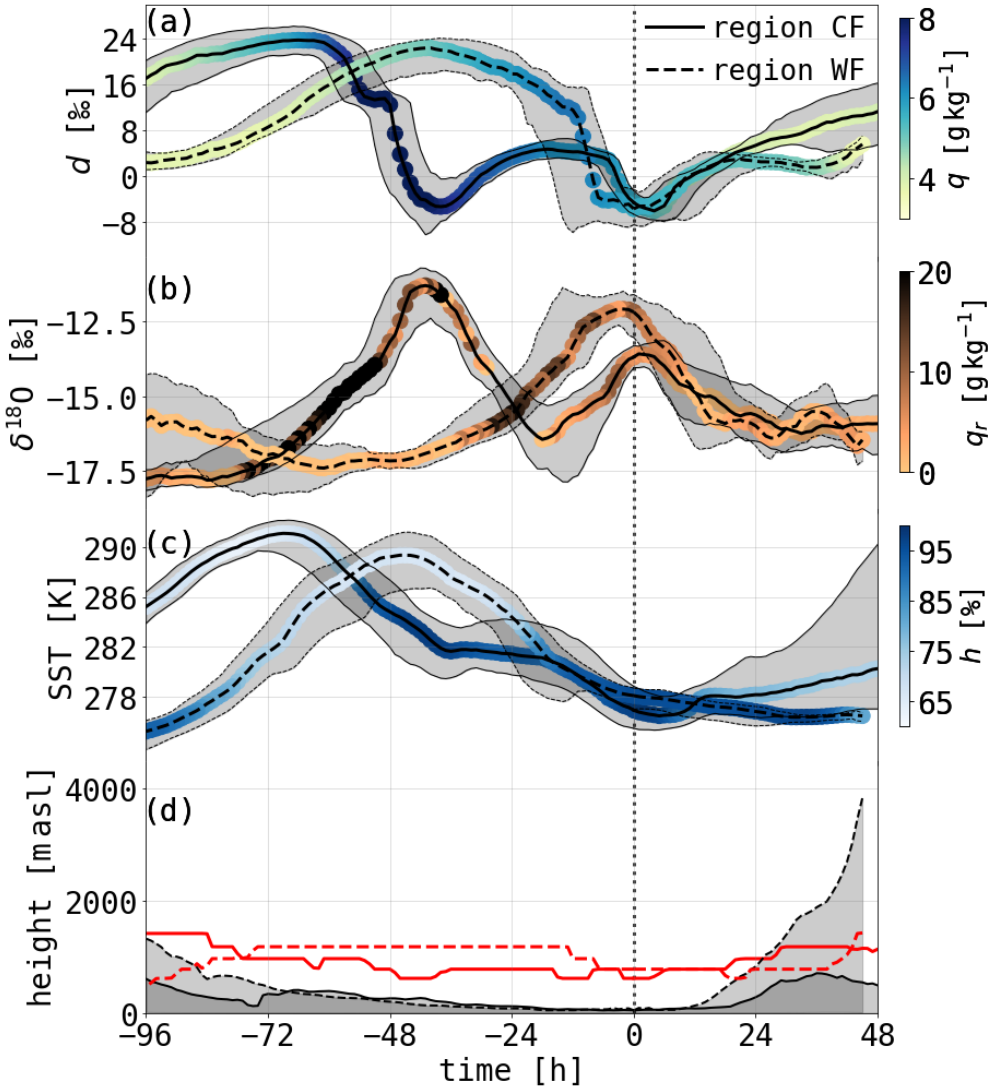

Figure S1: Evolution of mean **(a)** d (coloured by q), **(b)** δ^{18}O (coloured by the rain water content q_r) and **(c)** SST (coloured by relative humidity h) along the 96 h backward and 48 h forward trajectories starting at 22 UTC on 26 December 2016 in region CF (black solid line) and region WF (black dashed line). The grey areas show the [25,75]-percentile range for **(a)** d, **(b)** δ^{18}O and **(c)** SST along the trajectories. Panel **(d)** shows the evolution of the boundary layer height (red lines) and the minimal to maximal height extent (grey area) along the 96 h backward and 48 h forward trajectories for region CF (solid lines) and region WF (dashed lines).

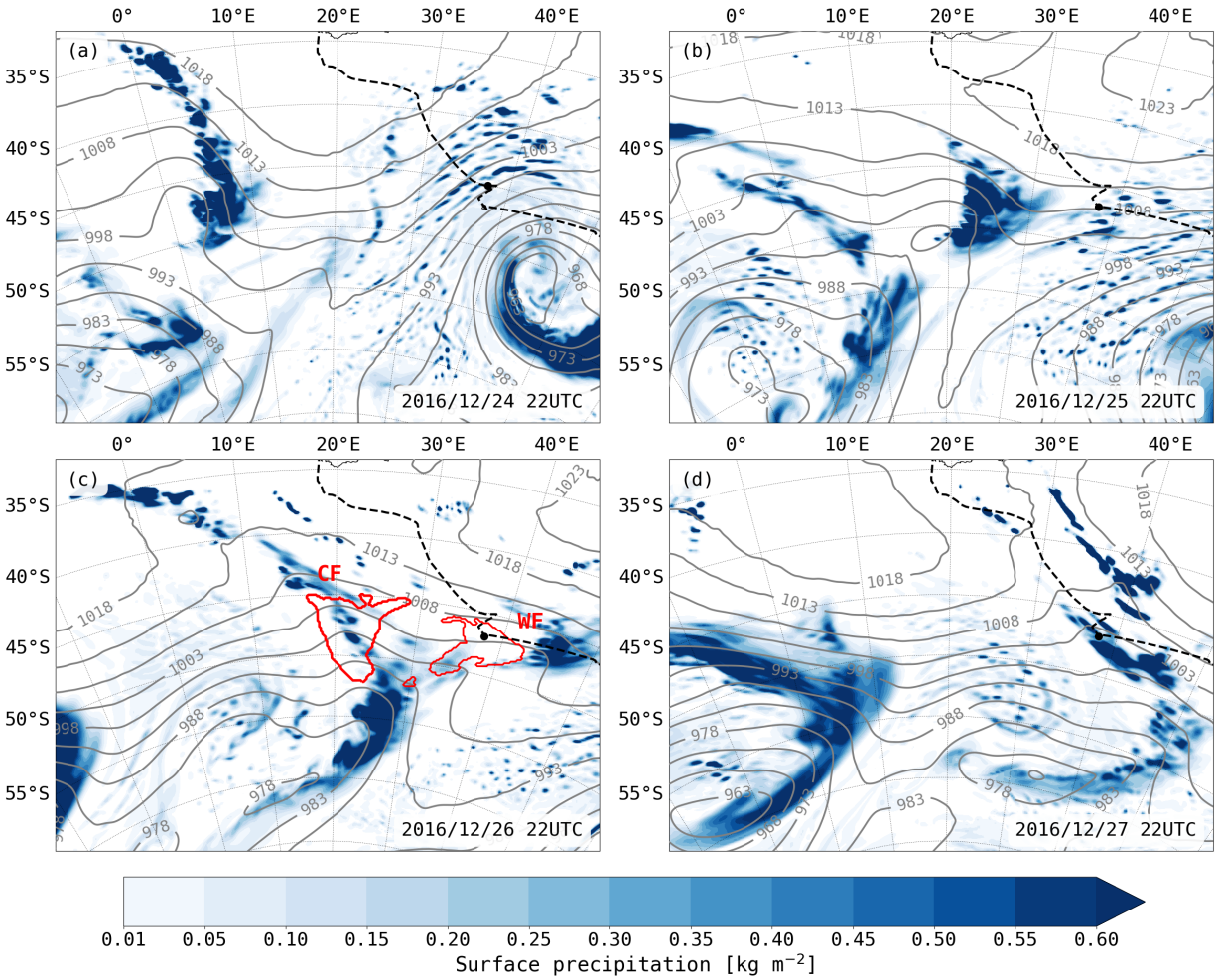

Figure S2: Surface precipitation and sea level pressure (grey contours, in hPa) at four time steps during the warm advection case study in $\text{COSMO}_{\text{iso}}$. The black dashed line shows the ACE ship track and the black dot denotes the position of the research vessel. The red framed regions CF and WF in panel **(c)** show the starting regions of the backward and forward trajectories at 22 UTC 26 Dec 2016.

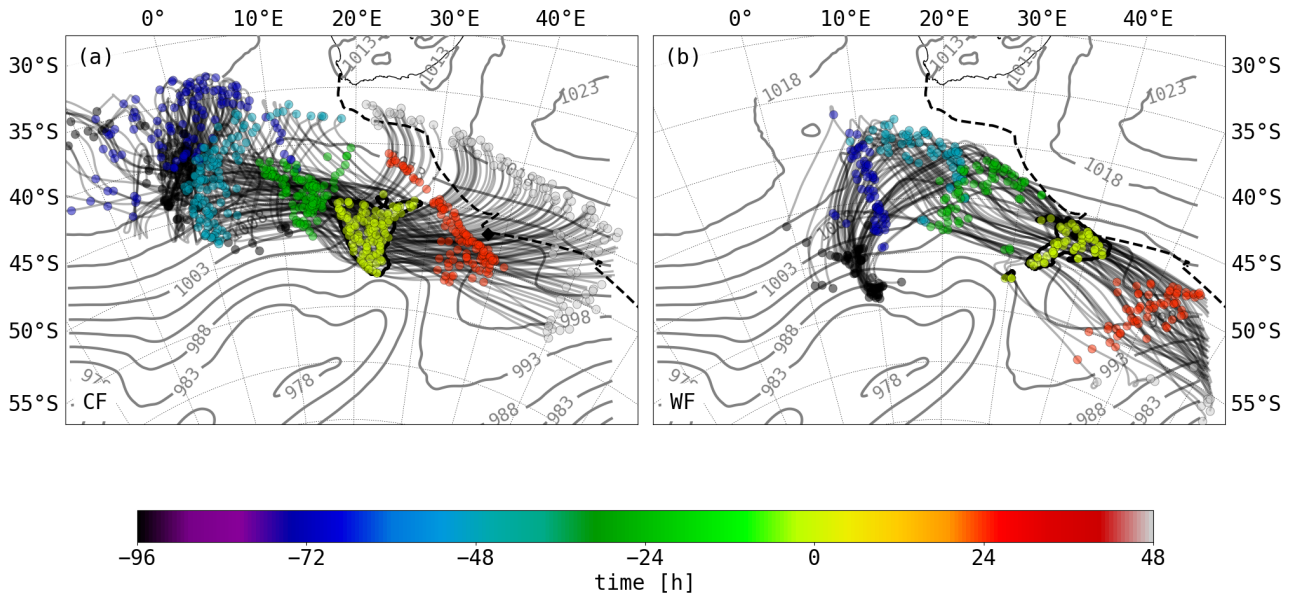

Figure S3: Mapplots of 96 h backward and 48 h forward trajectories starting at 22 UTC on 26 December 2016 in **(a)** region CF and **(b)** region WF with 24 h time steps (coloured dots). The regions CF and WF are indicated by black contours. The sea level pressure (grey contours) and the position of the ACE measurements (black diamond) are shown for 22 UTC on 26 December 2016. The ACE ship track is shown as dashed black line. For visibility, only every 15th trajectory is shown.

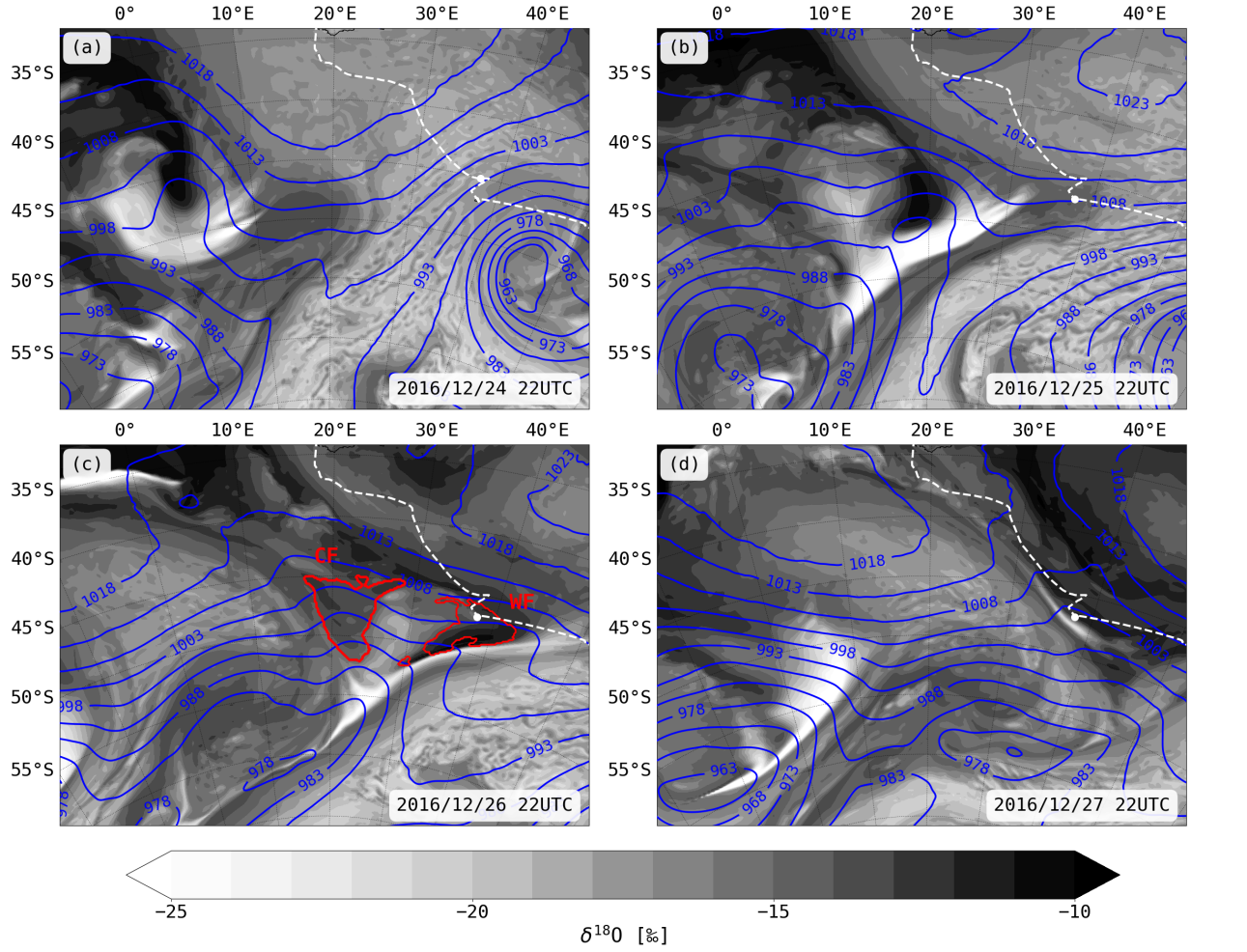

Figure S4: Same as Fig. S2, but showing horizontal cross sections of $\delta^{18}O$ on the lowest model level.