Air-sea exchange of acetone, acetaldehyde, DMS and isoprene at a UK coastal site.

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Supplementary

As described in the main text, we used simultaneous wind measurements from the PPAO (~19 m) and coastal autonomous buoy (4.9 m, ~4 km S-SW) to correct for flow acceleration due to the PPAO headland. Figure S1 shows the relationship between friction velocity and U_{10}, which agrees well with the Mackay and Yeun (1983) parameterisation and the COARE 3.5 model (Edson et al., 2013).

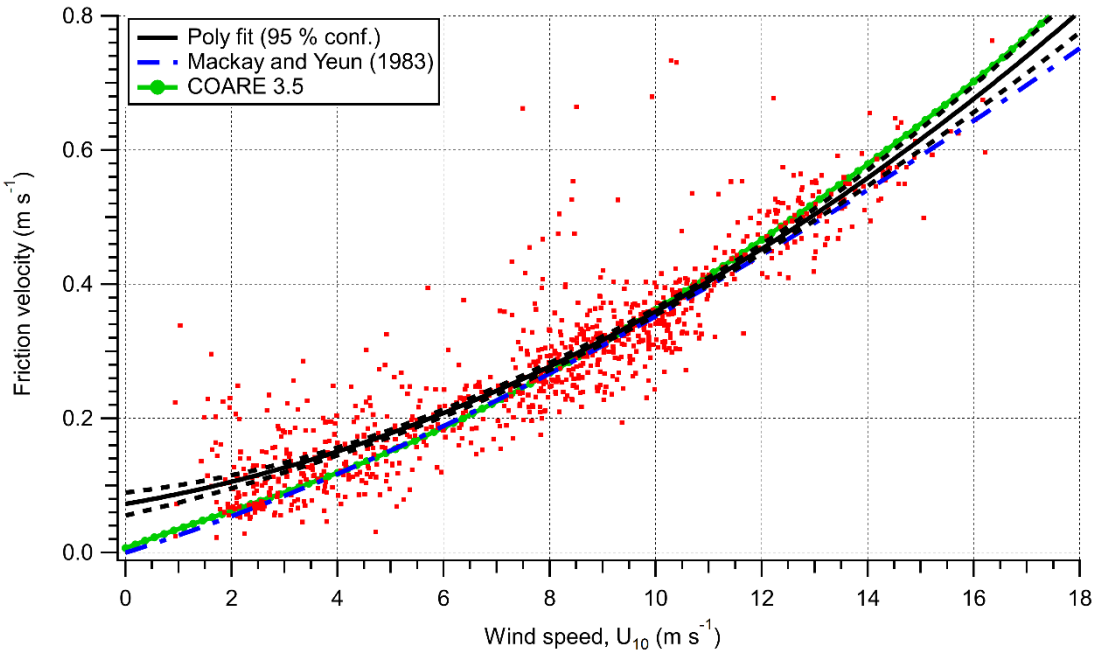

Figure S1: Comparison of measured friction velocity to wind speed (corrected to 10 m height). Data was filtered to remove influence of rain. Theoretical fit of Mackay and Yeun (1983) and COAREG 3.5 model (Edson et al., 2013) also shown.

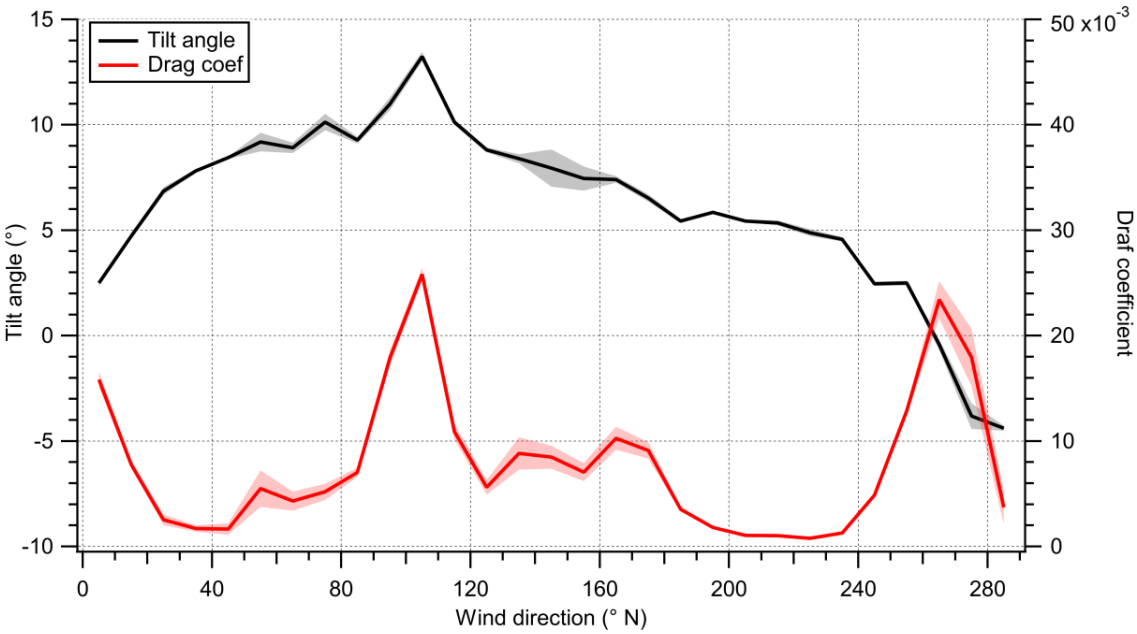

Figure S2: Vertical tilt angle correction (tilt of horizontal plane) applied to approaching winds and drag coefficient (> 3 m s^{-1}), averaged into 10° wind direction bins. Shaded region is 1 standard error.

Wind trajectories were calculated using Hyplit model (https://www.ready.noaa.gov/HYSPLIT_traj.php) archive GDAS 0.5° data for 01/05/18 (the day with the most complete atmospheric mixing ratio measurement with satisfactory blanking) using the following settings; trajectory direction: backward; start time: 18/05/02 00; total run time: 72; new trajectory: 1; maximum trajectories: 24; level 1 height: 0. The day of the 01/05/18 had clear sky in the morning but was overcast in the afternoon, as is evidenced by the Plymouth sun photometer data (https://www.westernchannelobservatory.org.uk/sunphotometer/). Furthermore, the NASA world view (https://worldview.earthdata.nasa.gov/) shows a clear front that moves east during the 01/05/18. The lack of strong PAR and solar irradiance on the 01/05/18, when the majority of the TL SW data was collected, is important considering that VOC lifetimes are dominated by photolysis and OH loss (i.e. acetaldehyde). The low PAR/solar irradiance will have meant that VOC lifetimes were extended and will have originated further upwind than on a clear day.

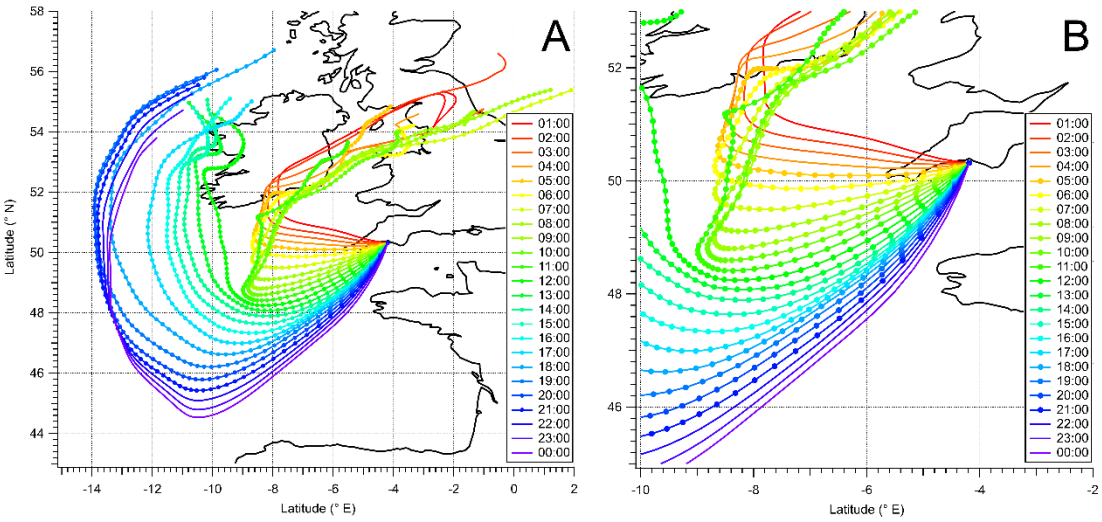

Figure S3: a) full and b) partial wind trajectories (72 h length) for a day (01/05/18) of near constant SW winds. Circles represent 1 h travel distances. Lines without circles correspond to periods removed by the quality control filtering for EC fluxes. The legend represents the hour of day the trajectory arrived at the observatory.