



## *Supplement of*

# **Rescuing historical weather observations improves quantification of severe windstorm risks**

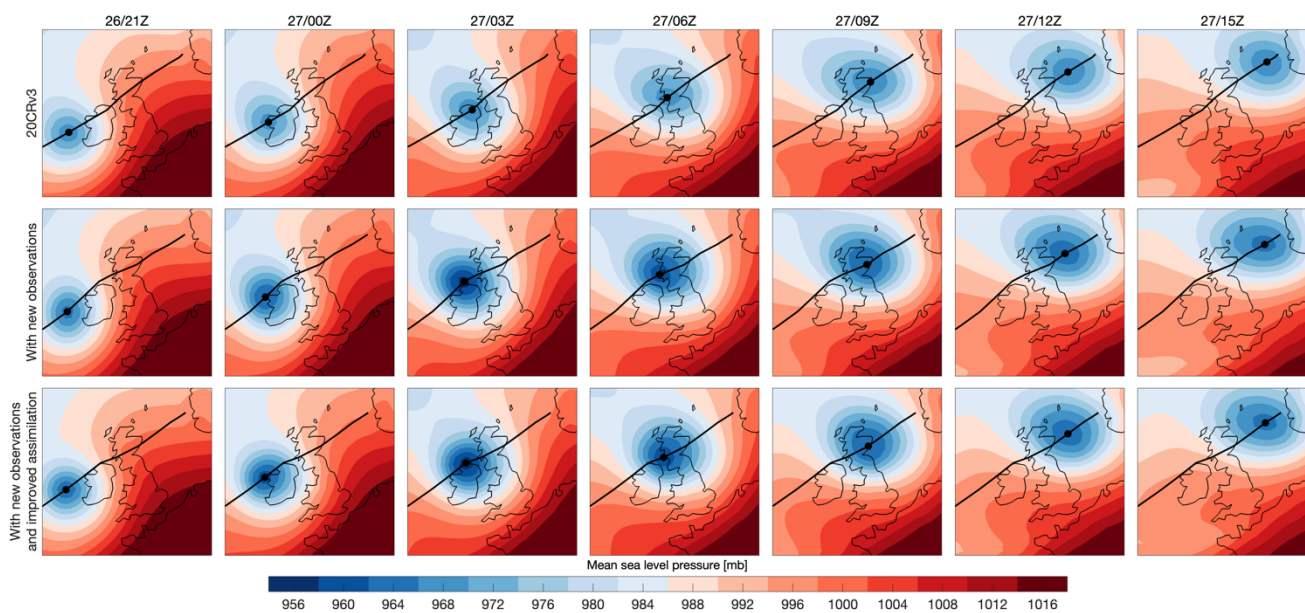
**Ed Hawkins et al.**

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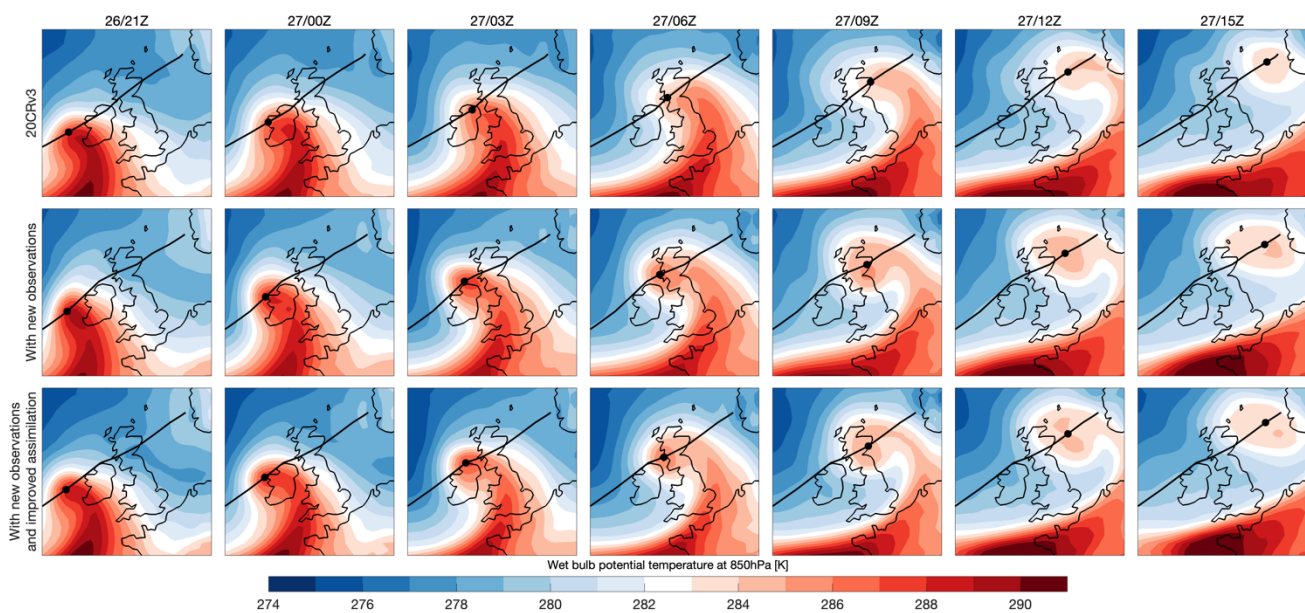
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## Supplementary Figures

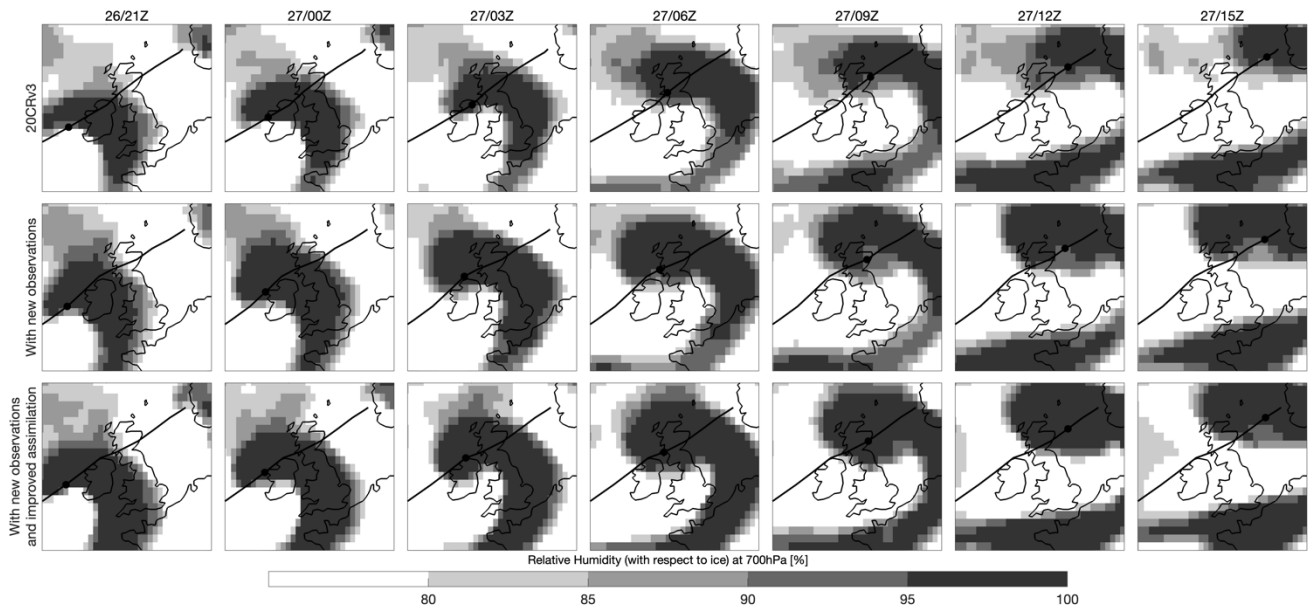
Figures S1-S6 illustrate the temporal evolution of Storm Ulysses in 20CRv3 and the two experimental versions of the reanalysis for key variables – mean sea level pressure (Figure S1), wet bulb potential temperature at 850hPa (Figure S2), relative humidity with respect to ice at 700hPa (Figure S3), wind speed at 850hPa (Figure S4), ensemble likelihood of wind speed at 850hPa above  $38\text{ms}^{-1}$  (Figure S5) and precipitation (Figure S6). All these figures use the ensemble mean, except for Figure S5 which shows the fraction of ensemble members above the wind threshold at each time. In the two reanalysis experiments, the features are sharper and more pronounced, with the severity of the storm increasing, compared to the original 20CRv3.



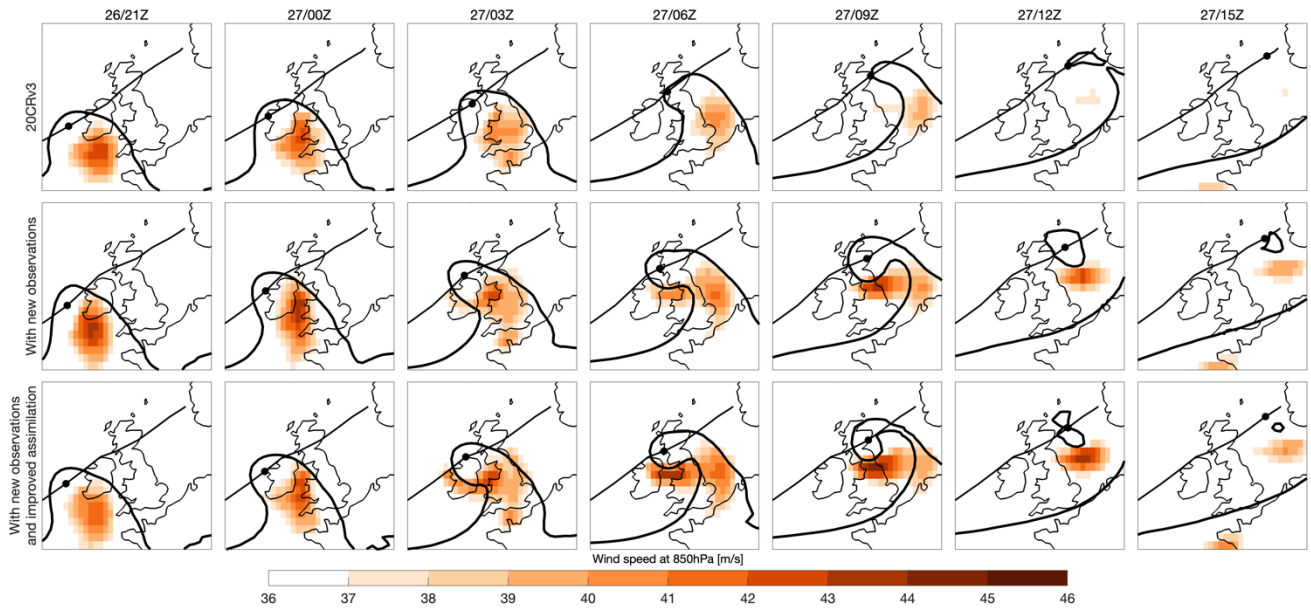
**Figure S1:** mean sea level pressure during Storm Ulysses (ensemble mean). The storm track is shown by the black line with solid circle representing the centre of the low pressure



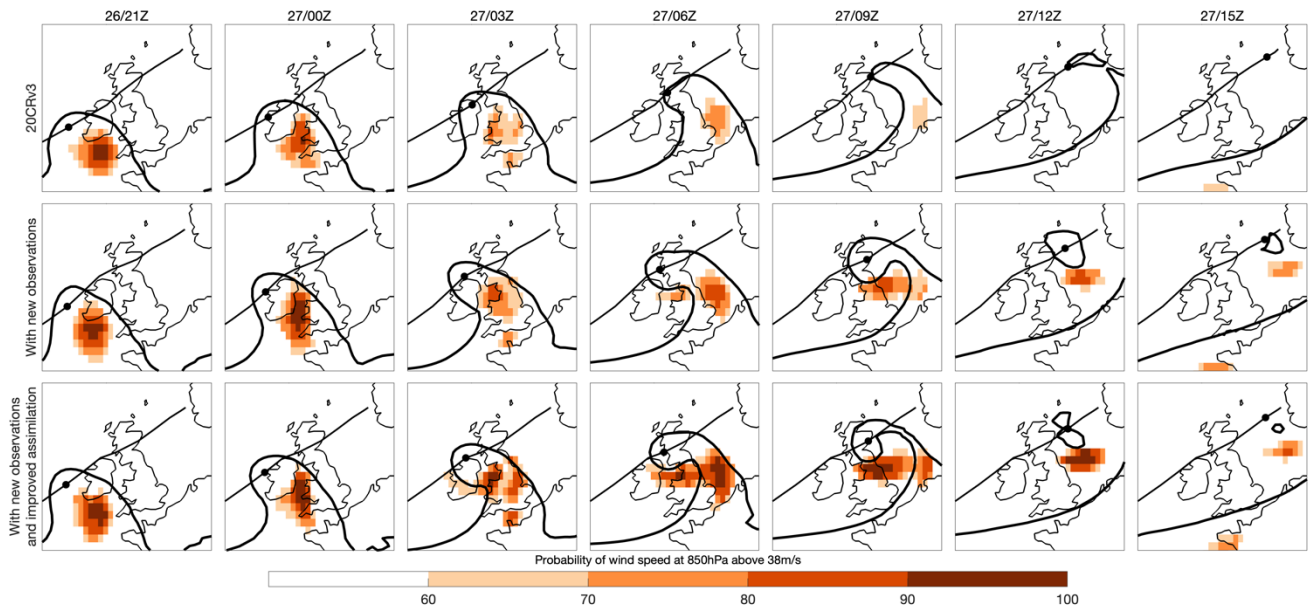
**Figure S2:** wet bulb potential temperature at 850hPa during Storm Ulysses (ensemble mean). The storm track is shown by the black line with solid circle representing the centre of the low pressure.



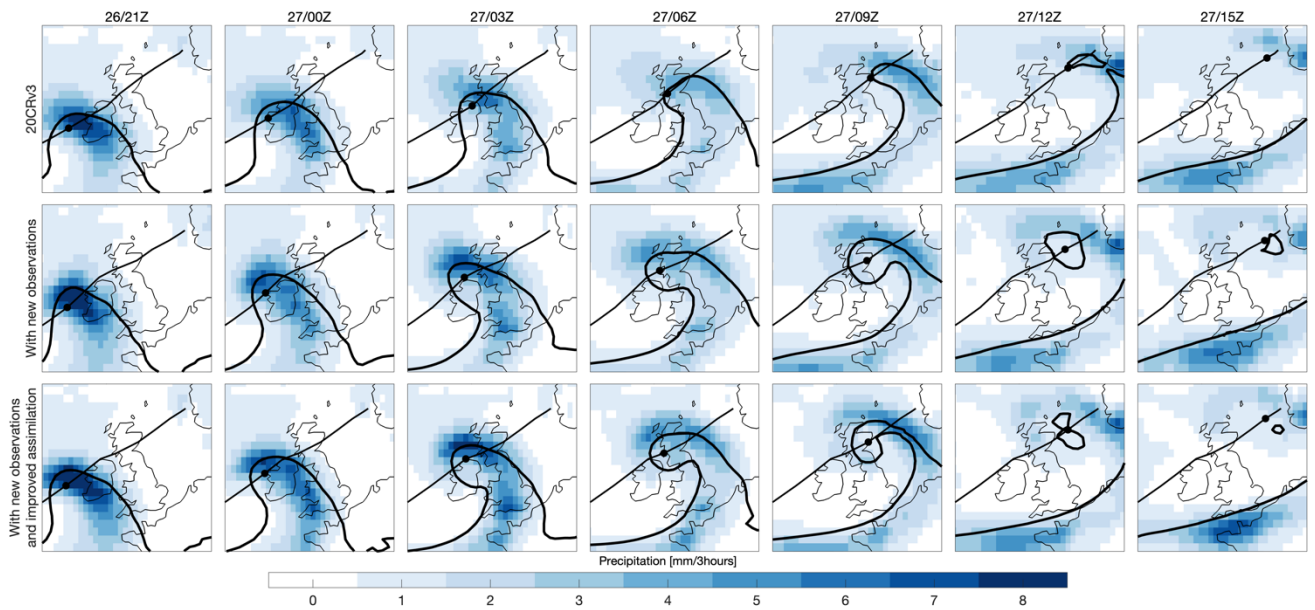
**Figure S3:** relative humidity with respect to ice at 700hPa during Storm Ulysses (ensemble mean). Values above 80% roughly denote the cloud head of the storm. The storm track is shown by the black line with solid circle representing the centre of the low pressure.



**Figure S4:** wind speed at 850hPa during Storm Ulysses (ensemble mean). The black contour is the 284K wet bulb temperature isotherm at 850hPa. The storm track is shown by the black line with solid circle representing the centre of the low pressure.



**Figure S5:** ensemble likelihood of wind speed at 850hPa above 38ms<sup>-1</sup> during Storm Ulysses. The black contour is the 284K wet bulb temperature isotherm at 850hPa. The storm track is shown by the black line with solid circle representing the centre of the low pressure.



**Figure S6:** precipitation during Storm Ulysses (ensemble mean). The black contour is the 284K wet bulb temperature isotherm at 850hPa. The storm track is shown by the black line with solid circle representing the centre of the low pressure.