1. The results presented above assume that the sudden wind reversals occur at random times of the day: i.e. that they have no diurnal component. Suppose instead that the wind reversals occur routinely every 120 hours for each dataset, with the diurnal signal amplitude again 5 kt, but the amplitude of the noise terms set to zero. Fig. 6 compares the resulting means of the perturbations with the diurnal signal d(t). Now the mean diurnal cycle calculated from the perturbations is different to d(t). However, this is not surprising, as if we intend d(t)to be the diurnally varying part of the signal, we are implicitly assuming the noise n(t)and slowly varying terms s(t)do not vary diurnally: this assumption is violated when the reversal in wind direction occurs every 120 hours, i.e. at the same time of day every 5 days. Thus, for d(t)to genuinely represent the diurnal part of the signal, we would have to alter it every five days to include the sudden shifts in wind direction, then setting the “slowly varying” component to zero.

Note that for real weather systems, there are important interactions between synoptic and diurnal processes that could affect, for instance, the timing or intensity of cold fronts (e.g. Mills 2005) and hence mean diurnal signals. Suppose this means that synoptic cold fronts are more likely to pass over certain coastal regions at particular times of day, or are more intense at particular times of day, perhaps interacting in some way with sea-breezes. It is for this reason I am reluctant to filter such “cold front days” from my data, or restrict the study to tropical regions - the interaction between synoptic and diurnal processes could produce important differences between the official forecast, and model guidance datasets that affect their mean errors. When combined with the other discussion presented in this response showing that when means are taken, sudden shifts in background wind do not excessively affect mean DAE, I believe this is a defensible decision.