



Fig. S1. Domain of the dataset.

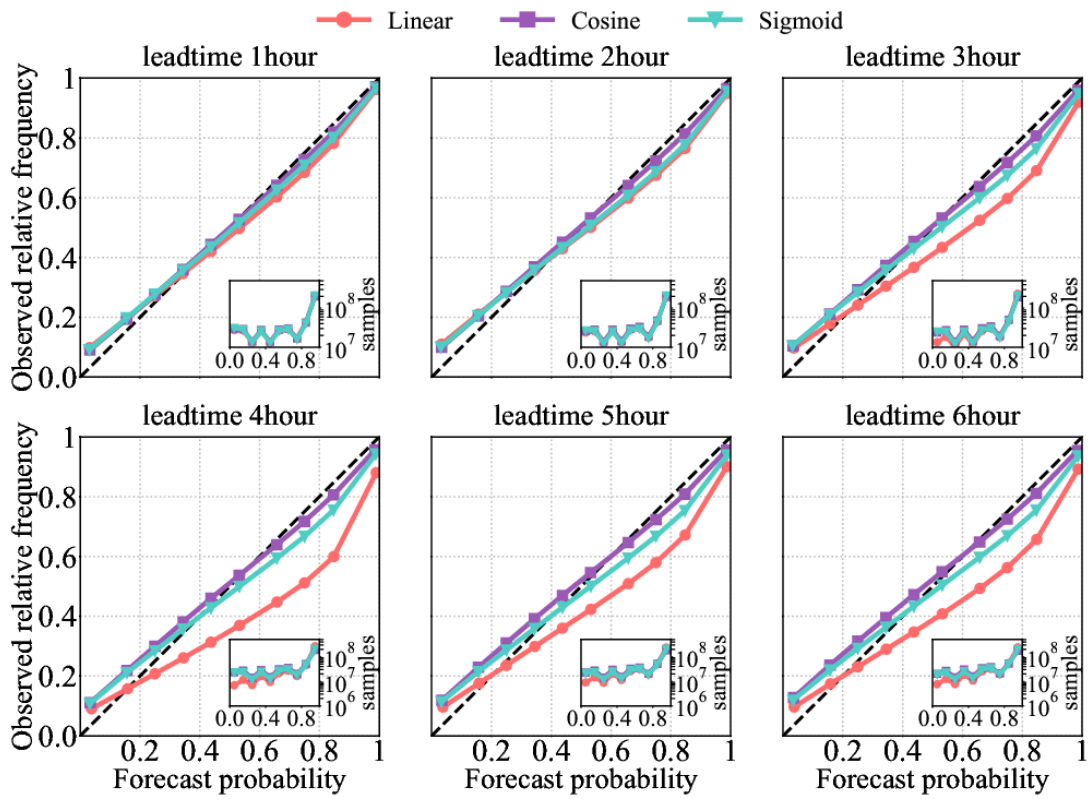


Fig. S2. Probability diagram of wind ensemble nowcasting in different lead time for three schedules with threshold  $1 \text{ m s}^{-1}$ . The upper of the plots are the probability curves while the bottom plots denote the corresponding statistics samples.

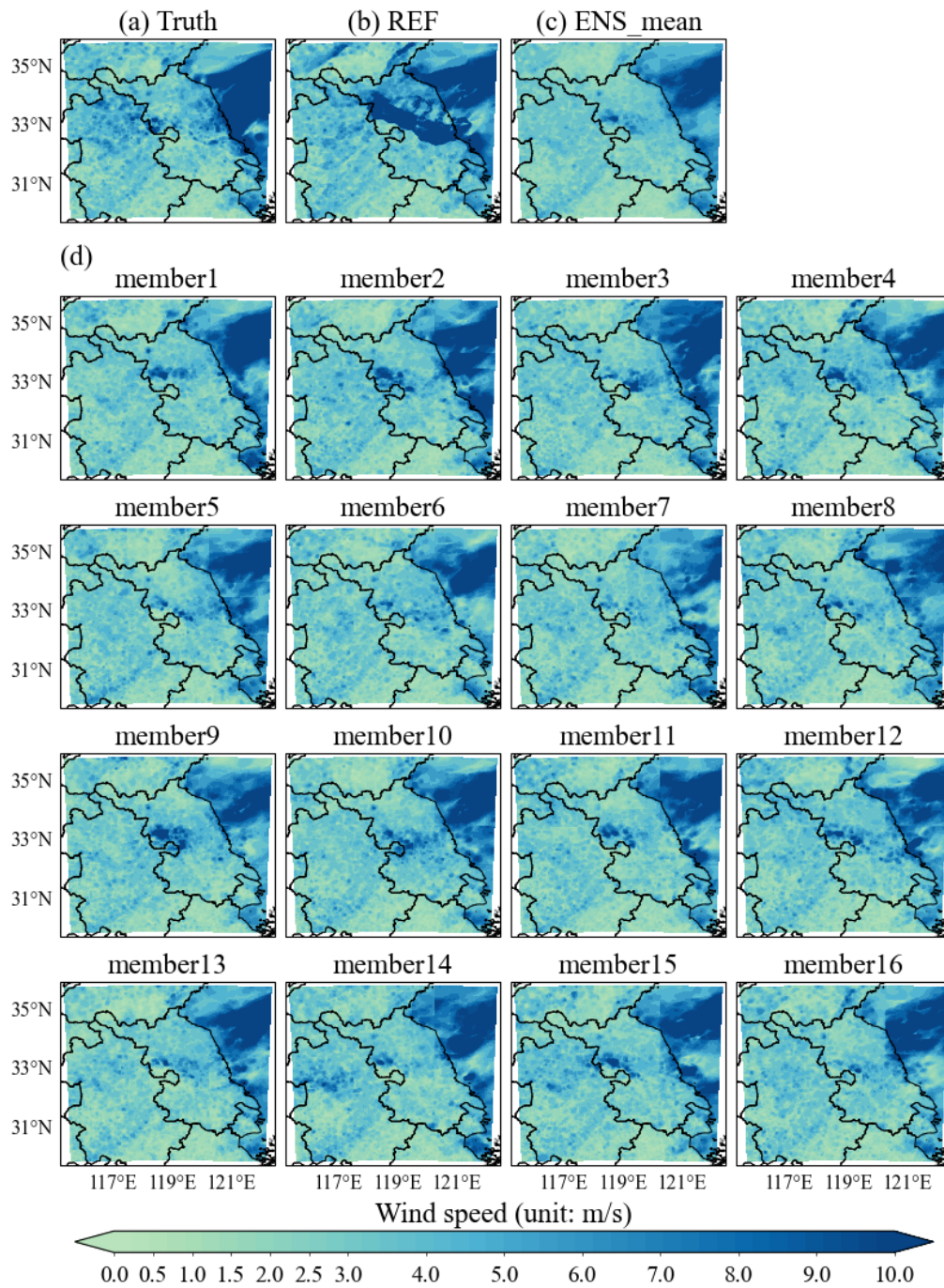


Fig. S3. Wind speed at 09:00 UTC on 10 June 2023 (Corresponding to the second column of Fig. 10). (a) ground truth, (b) 2-hour deterministic nowcast (REF), (c) 2-hour ensemble mean forecast from the DDPM with Cosine schedule (ENS\_mean), and (d) maps of ensemble members.

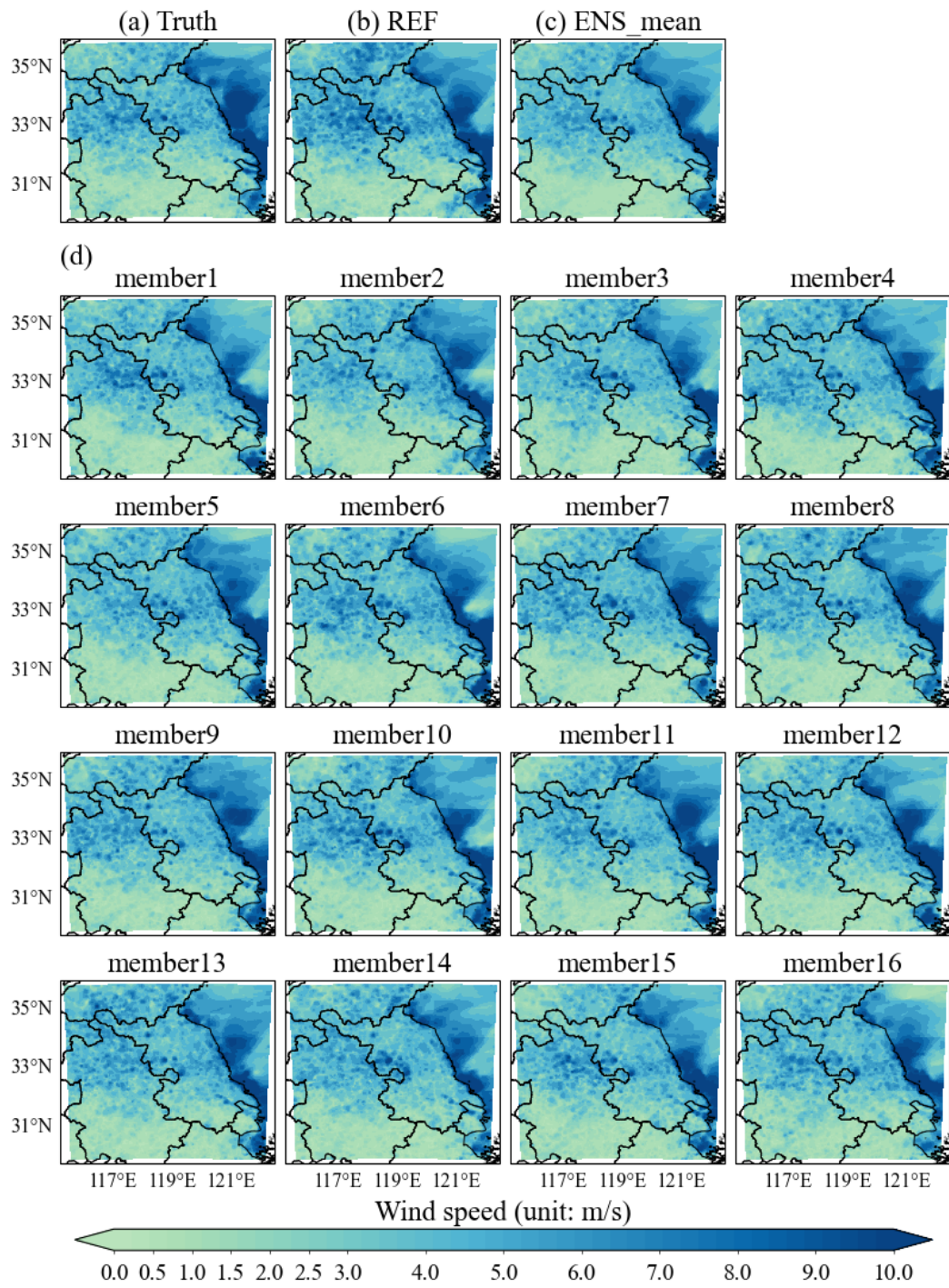


Fig. S4. The same as Fig. S3 but for 08:00 UTC on 24 June 2023.

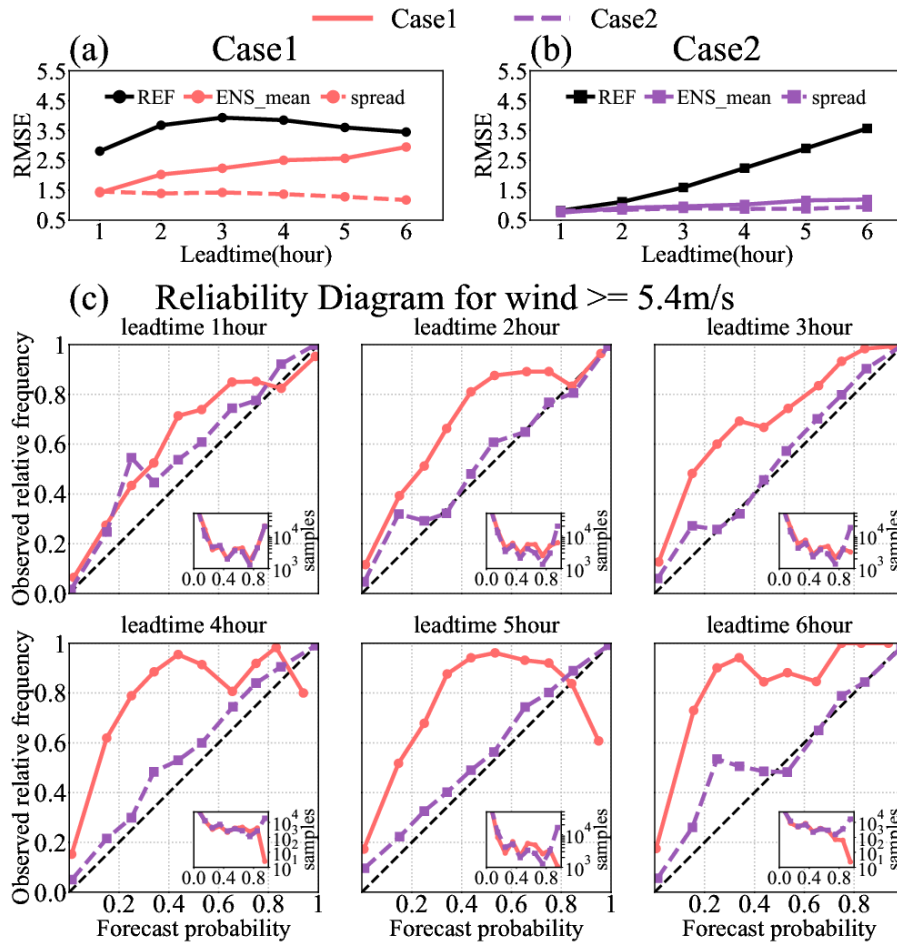


Fig. S5. RMSE and spread as a function of lead time for Case1 (a) and Case2 (b). Reliability diagram in different lead time with threshold  $5.4\text{ m s}^{-1}$  (c). These results are based on forecasts with different lead times for 09:00 UTC on 10 June 2023 (in Case 1) and for 08:00 UTC on 24 June 2023 (in Case 2).