whiffle

Whiffle Day-ahead vs. ECMWF Day-ahead

Wind speed forecasts verified against SCADA data of wind parks in NW-Europe, 2021–2023

Method for the Whiffle comparison

We compare modelled wind speed with **observed wind speed**. Errors are normalised with a **reference wind speed of 10 m/s**.

BIAS

$$\text{Bias} = \frac{\text{forecast} - \text{actual}}{\text{reference}}$$

Systematic over- or underestimation

ROOT MEAN SQUARE ERROR

$$\text{RMSE} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(\frac{\text{forecast}_i - \text{actual}_i}{\text{reference}}\right)^2}$$

Weights large deviations more heavily

MEAN ABSOLUTE PERCENTAGE ERROR

$$\text{MAPE} = \frac{1}{N}\sum_{i=1}^{N}\left|\frac{\text{forecast}_i - \text{actual}_i}{\text{reference}}\right|$$

Average size of the deviation

Correlation and covariance are calculated without normalisation

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Time stamps: ECMWF vs Whiffle

2021/09 – 2023/09

Evaluation period

10:00 CET

Forecasts stored for day-ahead

Right-aligned

ECMWF and Whiffle time-step values are both right-hand-side aligned

Start-time alignment

ECMWF start time	Whiffle start time
2021-09-01 02:00:00+02:00	0 min (starts 2021-09-01 00:00 UTC)
2021-09-01 02:15:00+02:00	15 min
…	…

Error metrics: Whiffle overall better

Day-ahead forecasts compared with SCADA data for an onshore and offshore wind park in NW-Europe

Offshore

Metric	Whiffle DA	ECMWF DA
Bias in %	**1.9**	6.2
RMSE in %	**17.8**	18.9
MAPE in %	**12.9**	14.2
Pearson's correlation	0.924	0.924
Covariance* in %	**90.6**	89.0

Onshore

Metric	Whiffle DA	ECMWF DA
Bias in %	**3.2**	4.8
RMSE in %	**13.8**	14.2
MAPE in %	**10.4**	10.8
Pearson's correlation	0.890	**0.894**
Covariance* in %	92.5	**92.6**

1.9% vs 6.2%

Bias offshore, Whiffle vs ECMWF

Especially a reduction of bias

Lower Bias, RMSE and MAPE at both parks, correlation on par.

*Covariance in % := cov([Whiffle or ECMWF], obs) / cov(obs, obs), calculated without normalisation

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