

User-oriented evaluation of reanalyses at DWD with focus on offshore wind energy

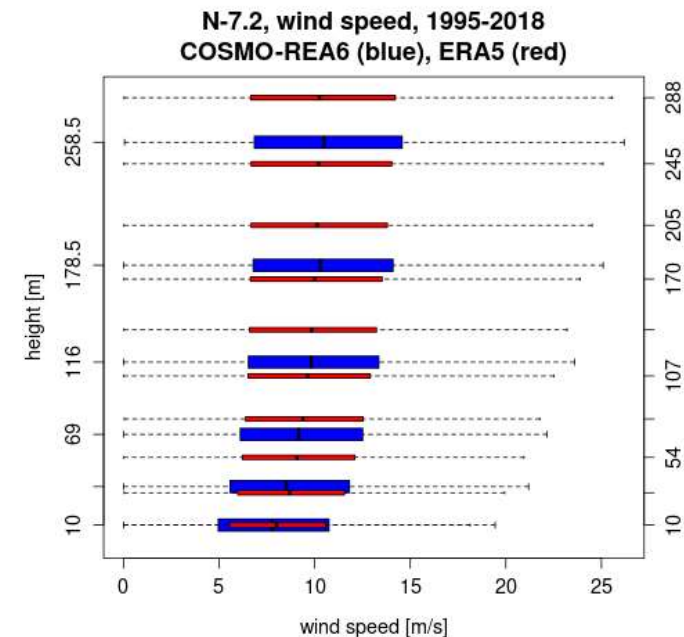
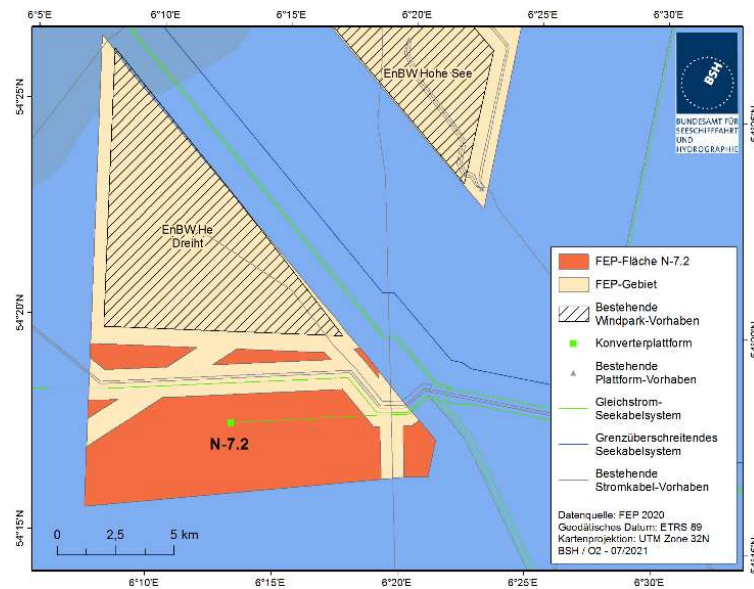
**Thomas Spangehl, Frank Kaspar, Michael Borsche, Thomas Möller,
Franziska Bär, Alexander Kelbch, Deborah Niermann,
Florian Imbery, Andreas Becker**

DWD, Germany

**IEA Wind TEM# 111 on REANALYSES FOR WIND ENERGY
25-26th April 2024, Lyngby, Denmark**



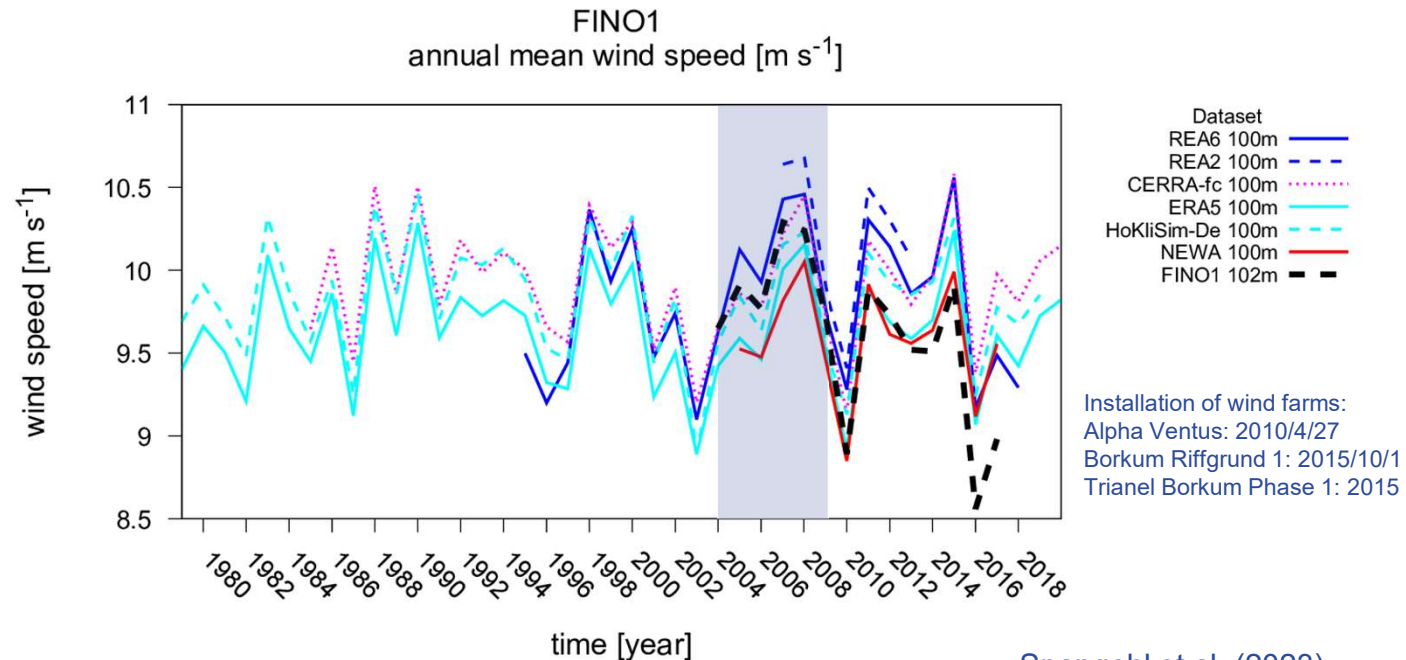
Provision of wind information for offshore site tenders of Federal Network Agency according to the Offshore Wind Energy Act



Data Hub Preliminary Investigation of Sites: <https://pinta.bsh.de/>



FINO - Forschungsplattformen in Nord- und Ostsee,
Fotos: www.dwd.de/fino-wind



Spanghel et al. (2023)

Evaluation of bias: focus on episodes prior to the installation of wind farms
in the direct vicinity of the FINO platforms to avoid wake effects.

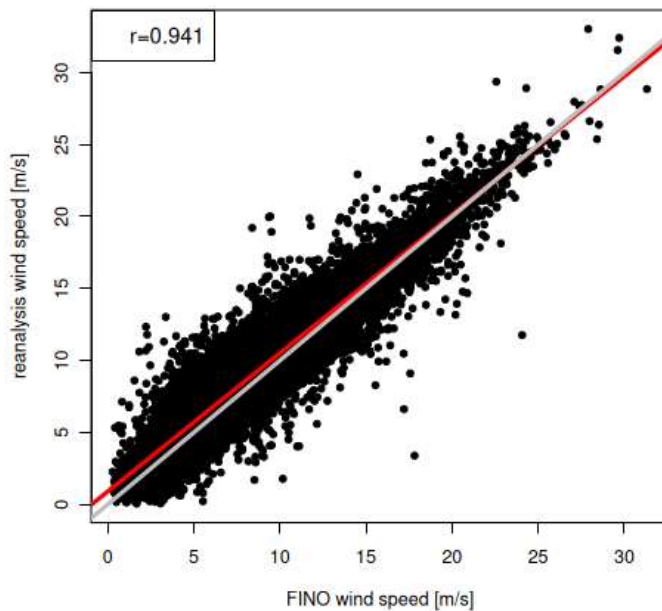
Evaluation of wind speed near 100 m at FINO1, 2016-2017, hourly data

COSMO-REA6

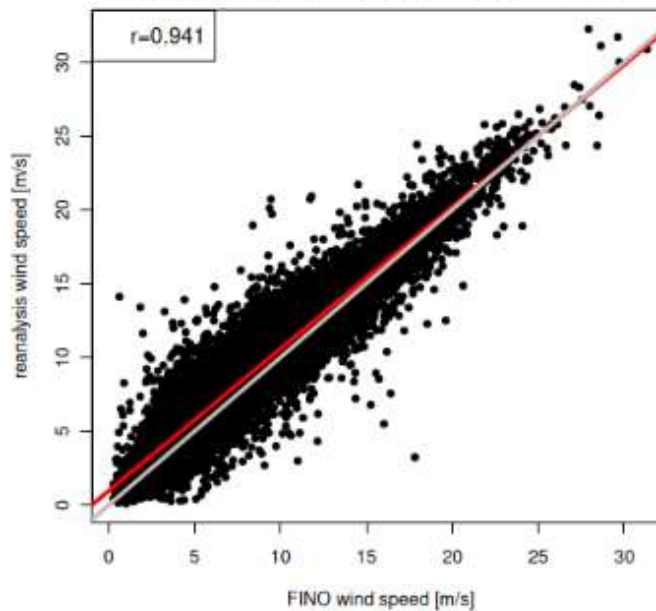
COSMO-R6G2

CERRA

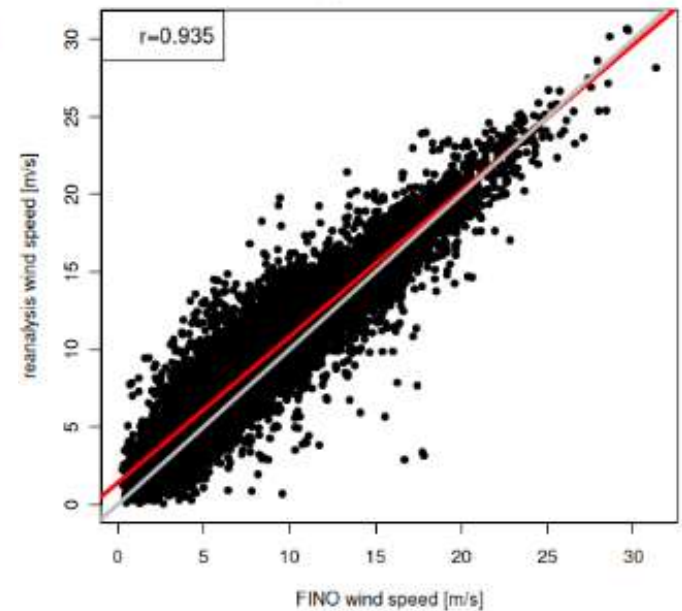
Regression analysis of hourly 100m wind speed of REA6 @FINO and 102 m wind speed of FINO1 for 2016 - 2017



Regression analysis of hourly 100m wind speed of COSMO-R6G2 @FINO and 102 m wind speed of FINO1 for 2016 - 2017

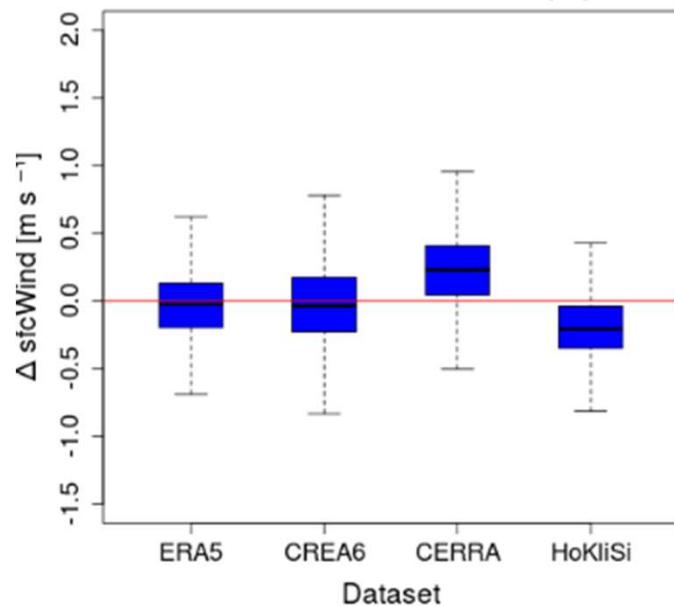


Regression analysis of hourly 100m wind speed of CERRA-1c @FINO and 102 m wind speed of FINO1 for 2016 - 2017

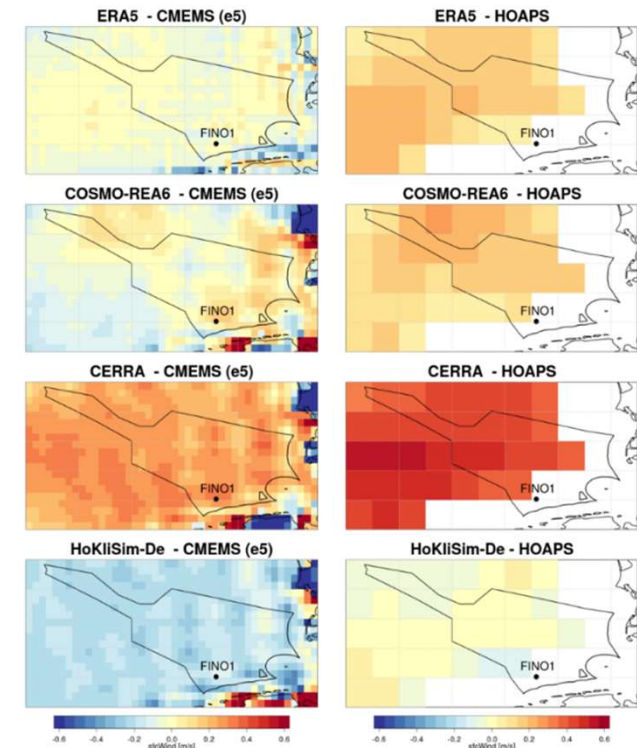
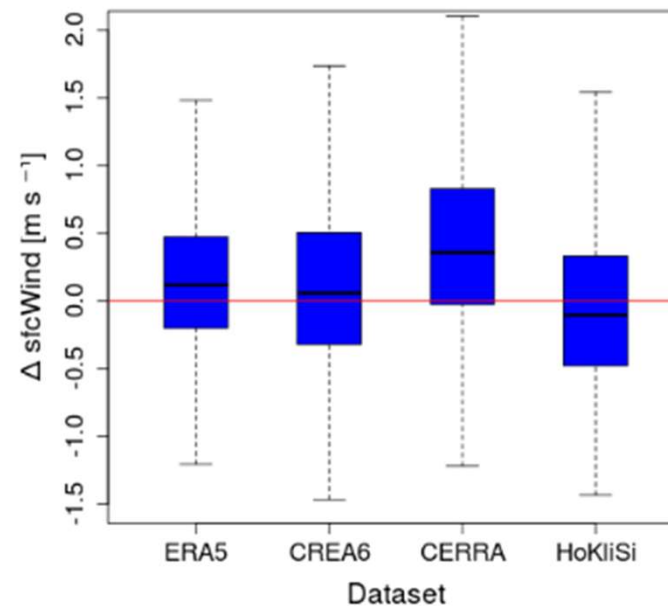


Evaluation using satellite data: bias distribution at German Exclusive Economic Zone of the North Sea, 2008-2017

Blas, 2008/01-2017/12, North Sea: 3-8.5° E/53.5-56° N
Reference: Scatterometer and Model (e5), CME MS

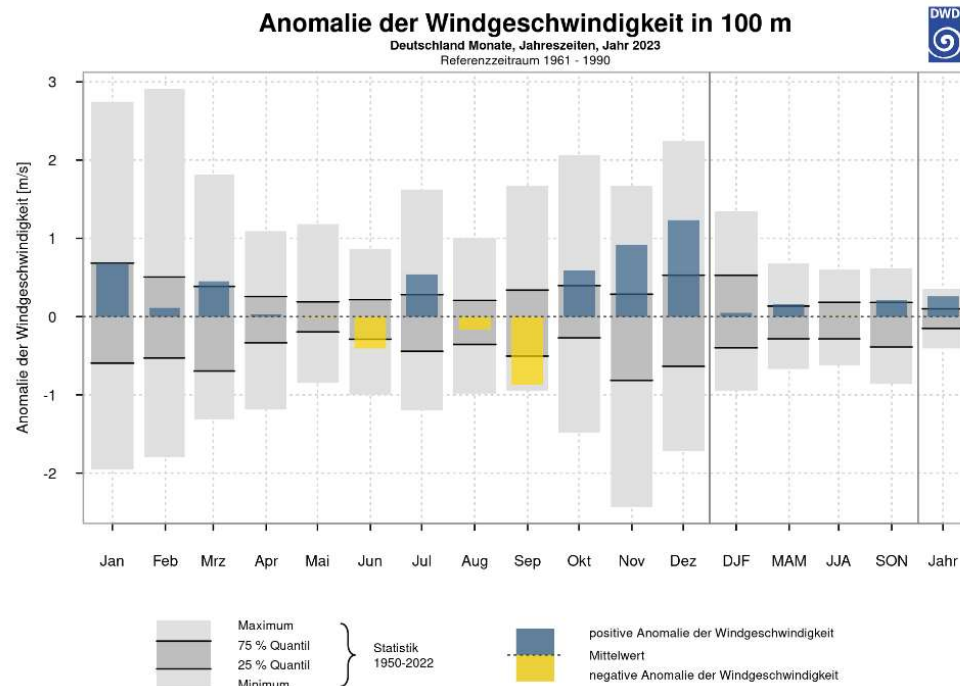


Blas, 2008/01-2017/12, North Sea: 3-8.5° E/53.5-56° N
Reference: HOAPS, CMSAF

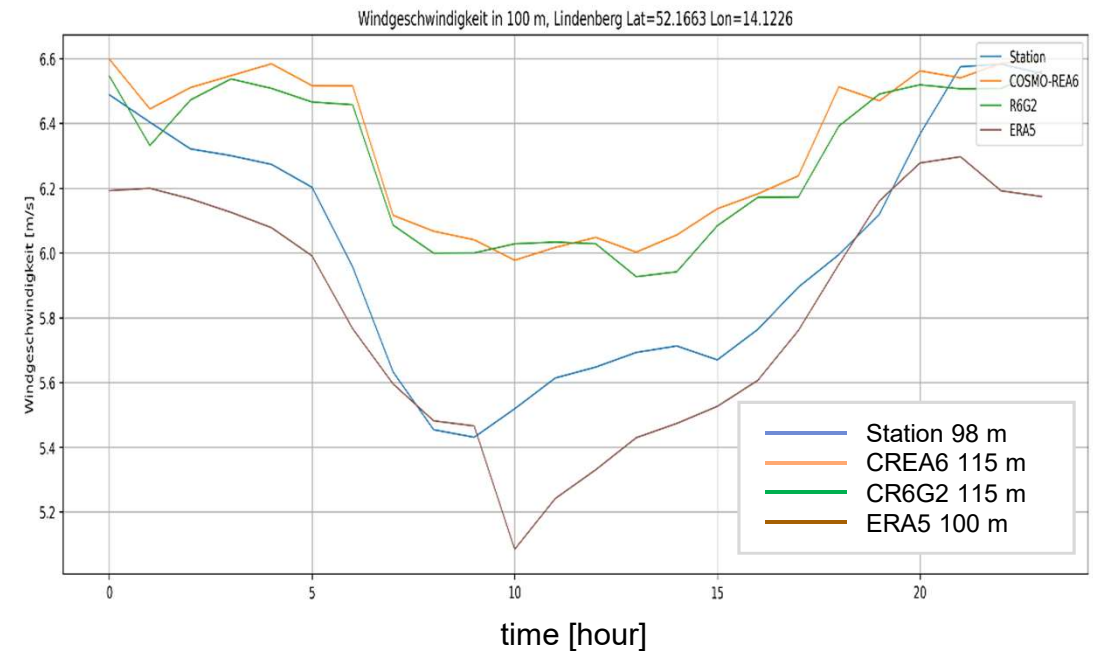


Spanghel et al. (2023), <https://doi.org/10.5194/asr-20-109-2023>

Wind speed 100 m, Germany Anomaly, year 2023, ERA5



Wind speed 98 m, Lindenberg Year 2018, Station Tower



F. Bär

Bär und Kaspar (2024), <https://www.dwd.de/energiewetter>

Summary

- Provision of reanalysis data and evaluation results for offshore site tenders conducted by Federal Network Agency (BNetzA) according to the German Offshore Wind Energy Act (WindSeeG).
- FINO (<https://www.fino-offshore.de/en/index.html>) provides wind information at heights up to 100 m. Global and regional Reanalyses resemble temporarily high-resolved wind speed measurements at FINO1 (102 m) research platform in Germany's Exclusive Economic Zone in the North Sea.
- Satellite-based data is applicable to evaluation of monthly averages of near-surface wind speed at Germany's Exclusive Economic Zone in the North Sea. Consistent results for different reference data sets (HOAPS, CMEMS).
- Station Towers and Masts and LIDAR measurements in Germany currently used for evaluation of wind speed and direction over German land areas. Cooperation within German research project MEDAILLON (funded by BMWK, Federal Ministry for Economic Affairs and Climate Action in Germany).

Thank you for your attention!



Research platform FINO1 (foreground) and wind turbines of wind farm Alpha Ventus (background).
© Forschungs- und Entwicklungszentrum Fachhochschule Kiel GmbH

Literature

- Kaspar, F., Niemann, D., Borsche, M., Fiedler, S., Keller, J., Potthast, R., Rösch, T., Spangehl, T., and Tinz, B.: Regional atmospheric reanalysis activities at Deutscher Wetterdienst: review of evaluation results and application examples with a focus on renewable energy, Adv. Sci. Res., 17, 115–128, <https://doi.org/10.5194/asr-17-115-2020>, 2020.
- Spangehl, T., Borsche, M., Niemann, D., Kaspar, F., Schimanke, S., Bienen, S., Möller, T., and Brast, M.: Intercomparing the quality of recent reanalyses for offshore wind farm planning in Germany's exclusive economic zone of the North Sea, Adv. Sci. Res., 20, 109–128, <https://doi.org/10.5194/asr-20-109-2023>, 2023.
- Schimanke, S., Ridal, M., Le Moigne, P., Berggren, L., Undén, P., Randriamampianina, R., Andrea, U., Bazile, E., Bertelsen, A., Brousseau, P., Dahlgren, P., Edvinsson, L., El Said, A., Ginton, M., Hopsch, S., Isaksson, L., Mladek, R., Olsson, E., Verrelle, A., and Wang, Z.: CERRA sub-daily regional reanalysis data for Europe on height levels from 1984 to present, CDS [data set], <https://doi.org/10.24381/cds.38b394e6>, 2021.
- Bär, F., Kaspar, F.: Energiewetter im Jahr 2023: Meteorologischer Jahresrückblick auf energierelevante Wetterelemente. Deutscher Wetterdienst / BMDV-Expertennetzwerk, 2024. https://www.dwd.de/DE/leistungen/energiewetter_rueckblick/publikationen/bericht_jahresrueckblick-2023.html