



Experience participating in
IEA-Task 31 Benchmarks

presented by Wolfgang Schlez
18/11/2020 at WRG meeting

ProPlanEn
Wind Energy Advisory

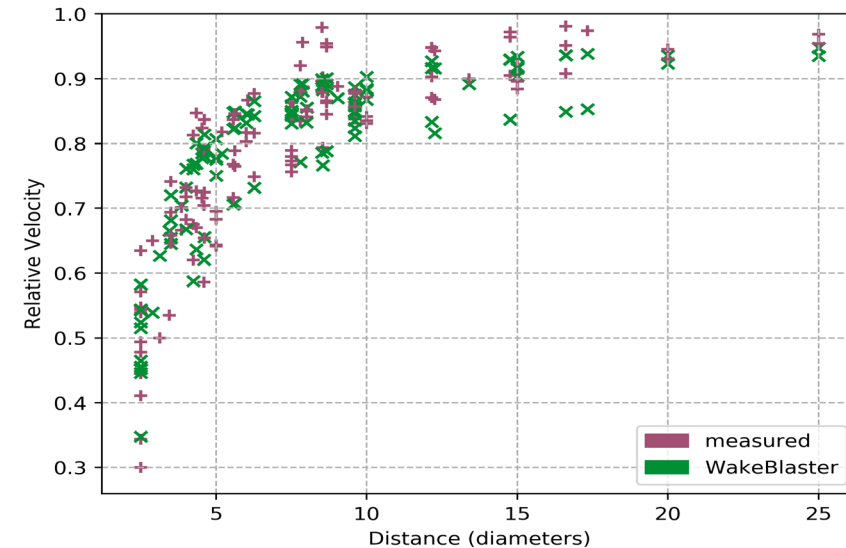
IEA Task 31 Benchmarks

Name	Configuration	Presented at
Horns Rev 1	deep array offshore	IEA Task 31 Milano, 2018
Lillgrund	tight array offshore	IEA TEM 88 2017 Edinburgh
Sexbierum	wake profiles	Not published
Swift	single flow case	WES Conf, Cork, 2019

More benchmarks under: <https://windbench.net/>

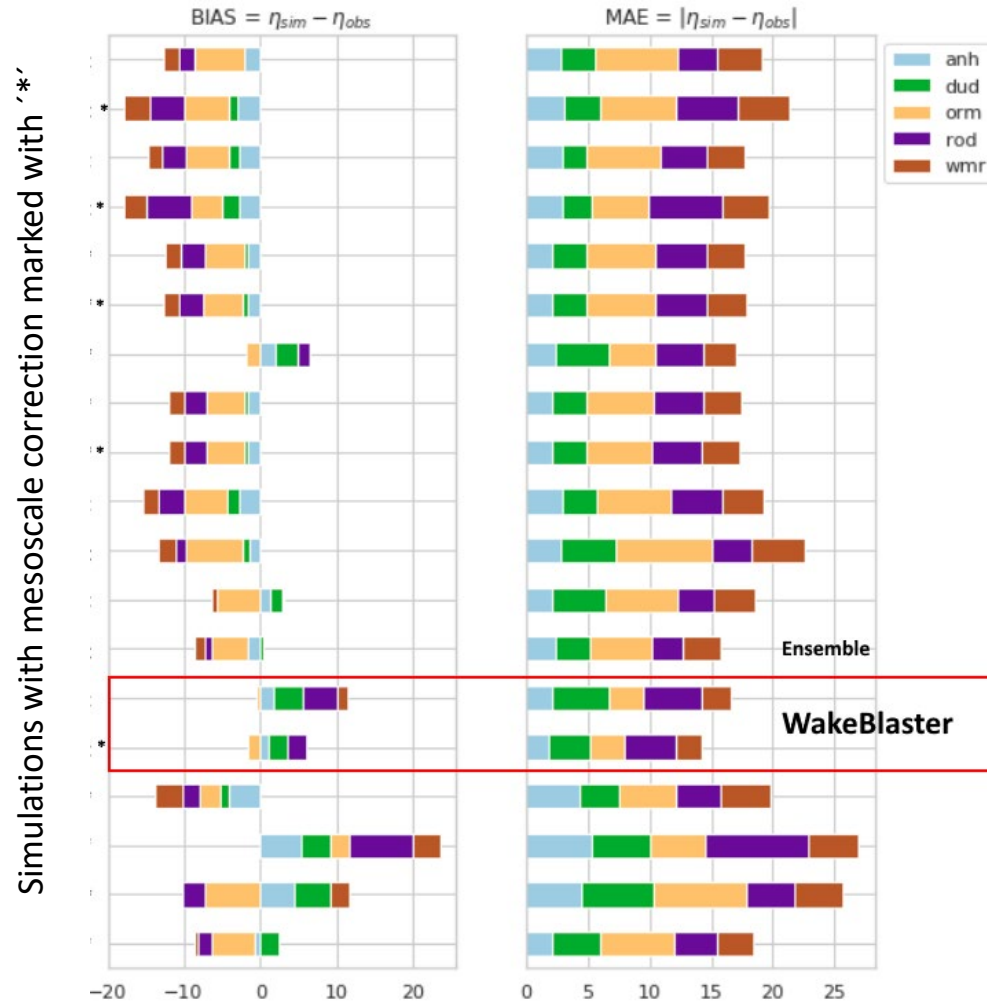
IEA Benchmark cases used while developing WakeBlaster
Results: <https://proplanen.info/wakeblaster>

Example Scatter plot of mast based wind measurements in the wake



ProPlanEn used to date data from to date approx. 20 wind farms (onshore and offshore) in the development of WakeBlaster. Each of these wind farms contributes new scenarios (wind speed, direction, turbulence, stability, ...). Field data is incomplete and imperfect, but each addition contributes to the overall picture. **IEA-Benchmarks contributed < 1% of scenarios, but > 40% to the number and variety of wind farms.**

IEA-OWA Blind Test

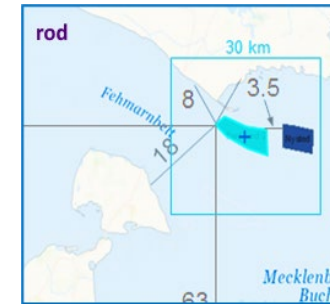
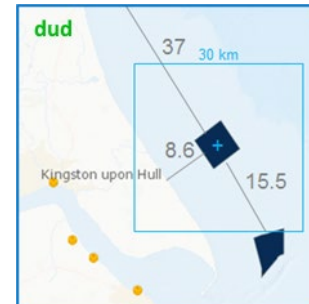
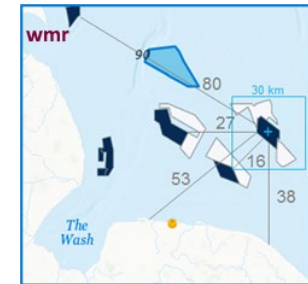
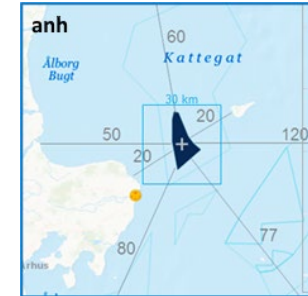


Scenarios:

- 5 offshore wind farms
- External wind farms
- Time series
- Stability based
- Inter cluster wakes

Testing:

- Inter-model comparison
- Operational performance
- Appropriate level of detail



Wake Loss Models

Model Element	Detail Level 0	Detail Level 1	Detail Level 2	Detail Level 3
Met Similarity	Distribution	Spatial Transition	Mesoscale	Climatic-Trends
Terrain	Speed-up	Resolution-CFD	Meso-Micro	Dynamic
Wind Profile	Transitions vert.	Perturbation	Ground, Stability	Coupled Impact
Turbulence	Roughness	Wake Induced	Variable Stability	Variable Direction
Power, Thrust	Density	Turbulence	Shear, Yaw, RAWS	Turbine Flexibility
Wind Farm	Layout	Curtailement	Control/Induction	Optimising Control
Software	WAsP/Park	CFD/Ainslie	WRF/WakeBlaster	R&D
Widespread use	approx. 1990	approx. 2010	approx. 2030	approx. 2050
Wake Uncertainty	approx. 20%	approx. 15%	approx. 12%	approx. 10%



Questions?

- **Acknowledgements:**
 - - Javier Sanz Rodrigo for managing the IEA/OWA benchmark
 - - Sascha Schmidt at ProPlanEn for data processing
- **News: Unlocking Blockage - Whitepaper now available!**
- **More Information:**
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