

Validity and applicability of mesoscale wind farm parametrization and LES offshore wind farm wake models

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<sup>1</sup>C2Wind (DK), <sup>2</sup>Veer Renewables (US), <sup>3</sup>Whiffle (NL)

Validation results show that mesoscale wind farm parametrization and LES models improve wake calculation offshore.

OBJECTIVES

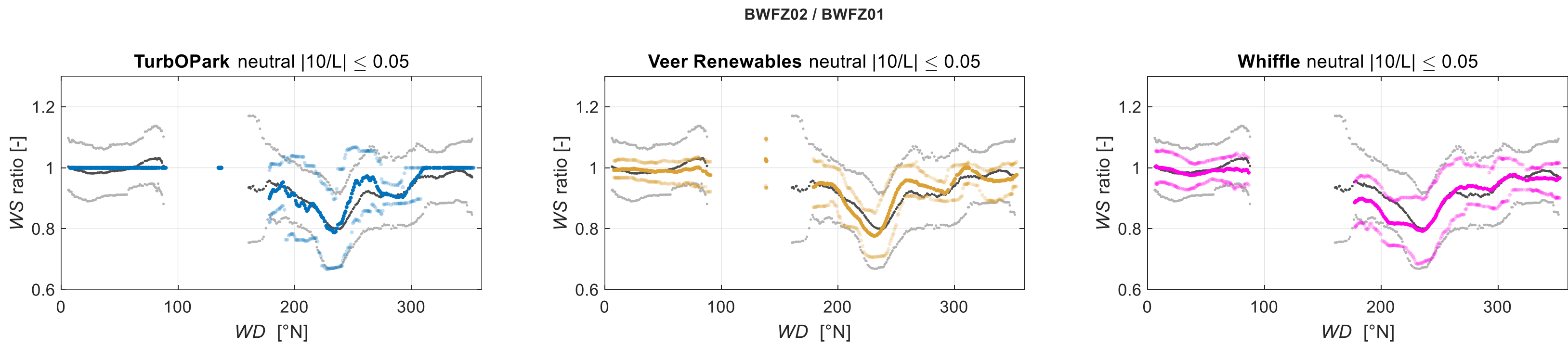
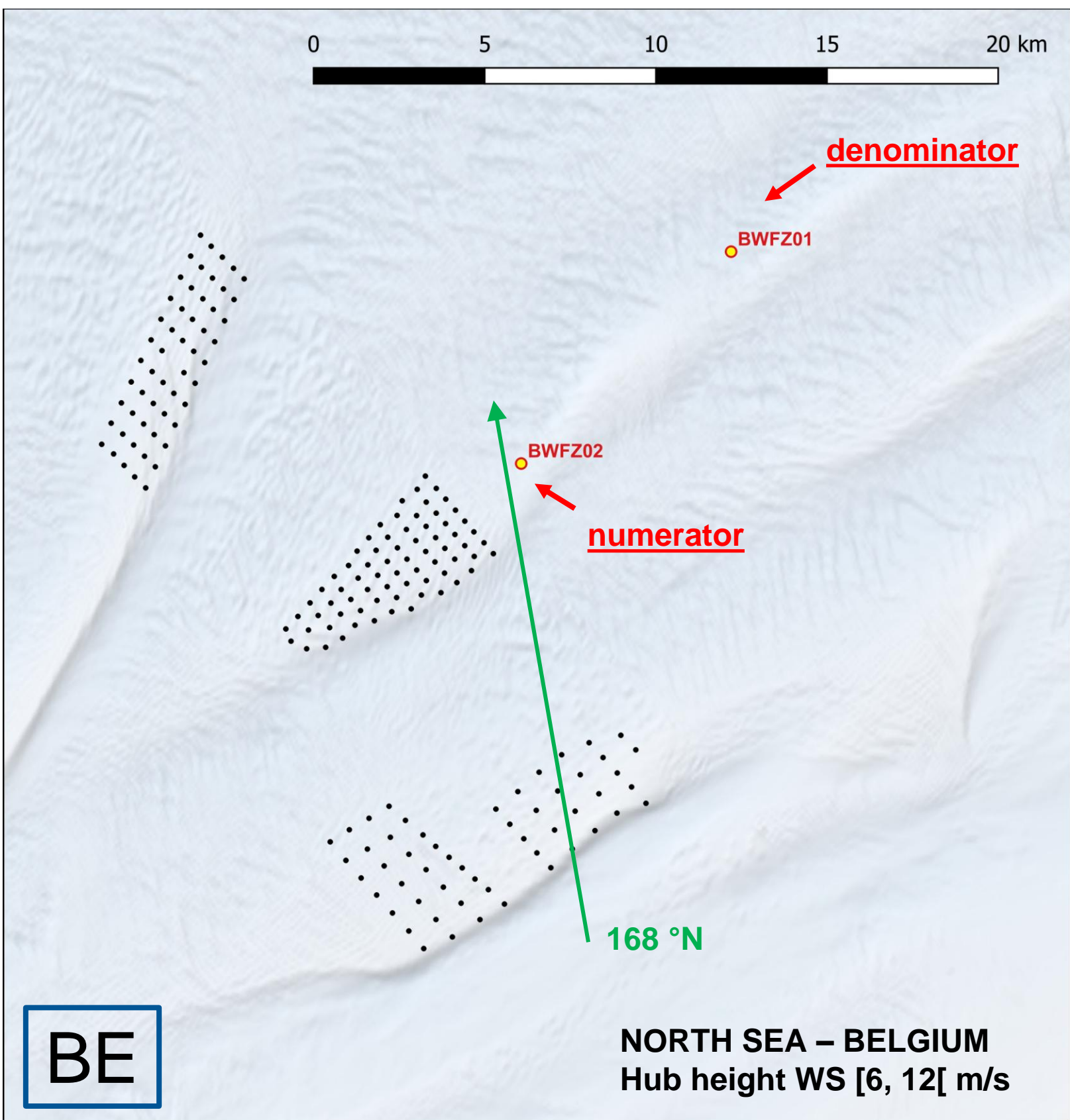
- Validate novel commercial mesoscale and LES wake models
- Long range wake effects
- Same layout and reanalysis (ERA5) inputs
- Compare with TurbOPark (using mesoscale time series, but *without directional speed up factors*)

METHODS

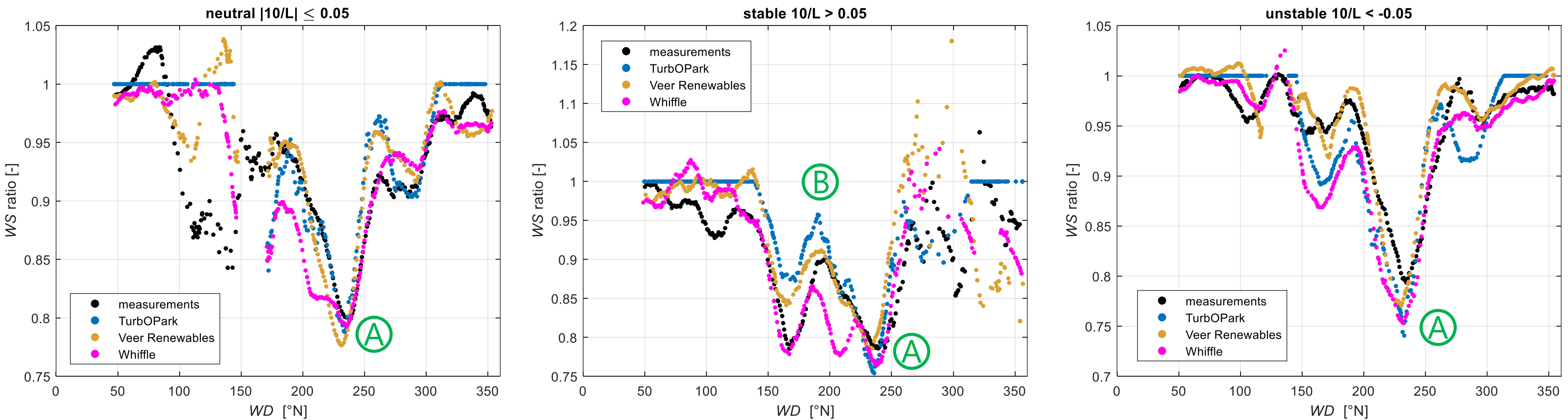
- Publicly available floating lidar datasets
- Two regions: Belgium and Baltic Sea
- Three stability classes (ERA5 Obukhov length)
- Moving averages (20°) vs wind direction
- At least 50 10-minute samples per bin

RESULTS

- Veer (WRF) and Whiffle (LES) models accurately model relative wind speed differences.
- They render combined mesoscale + atmospheric stability features
- These models should be part of the EYA toolchain

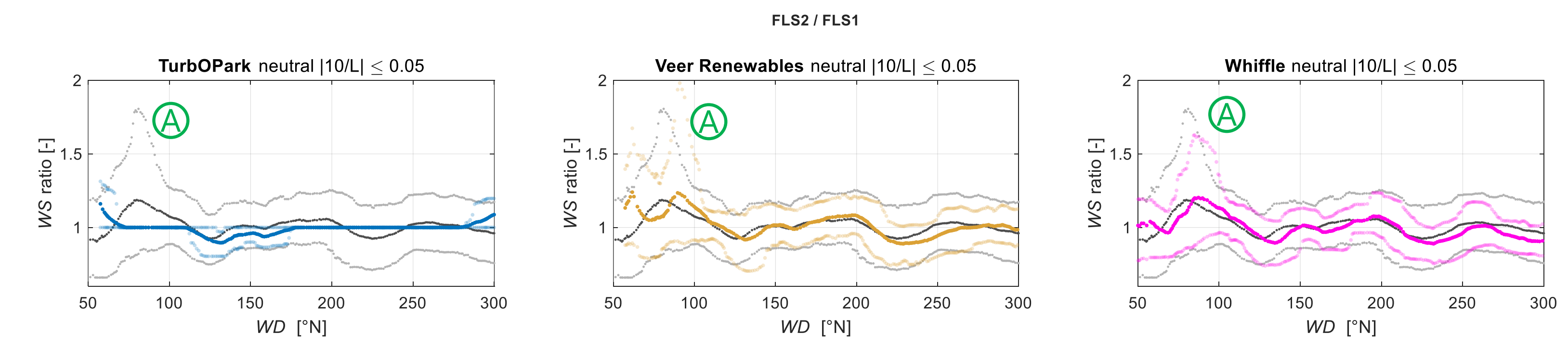
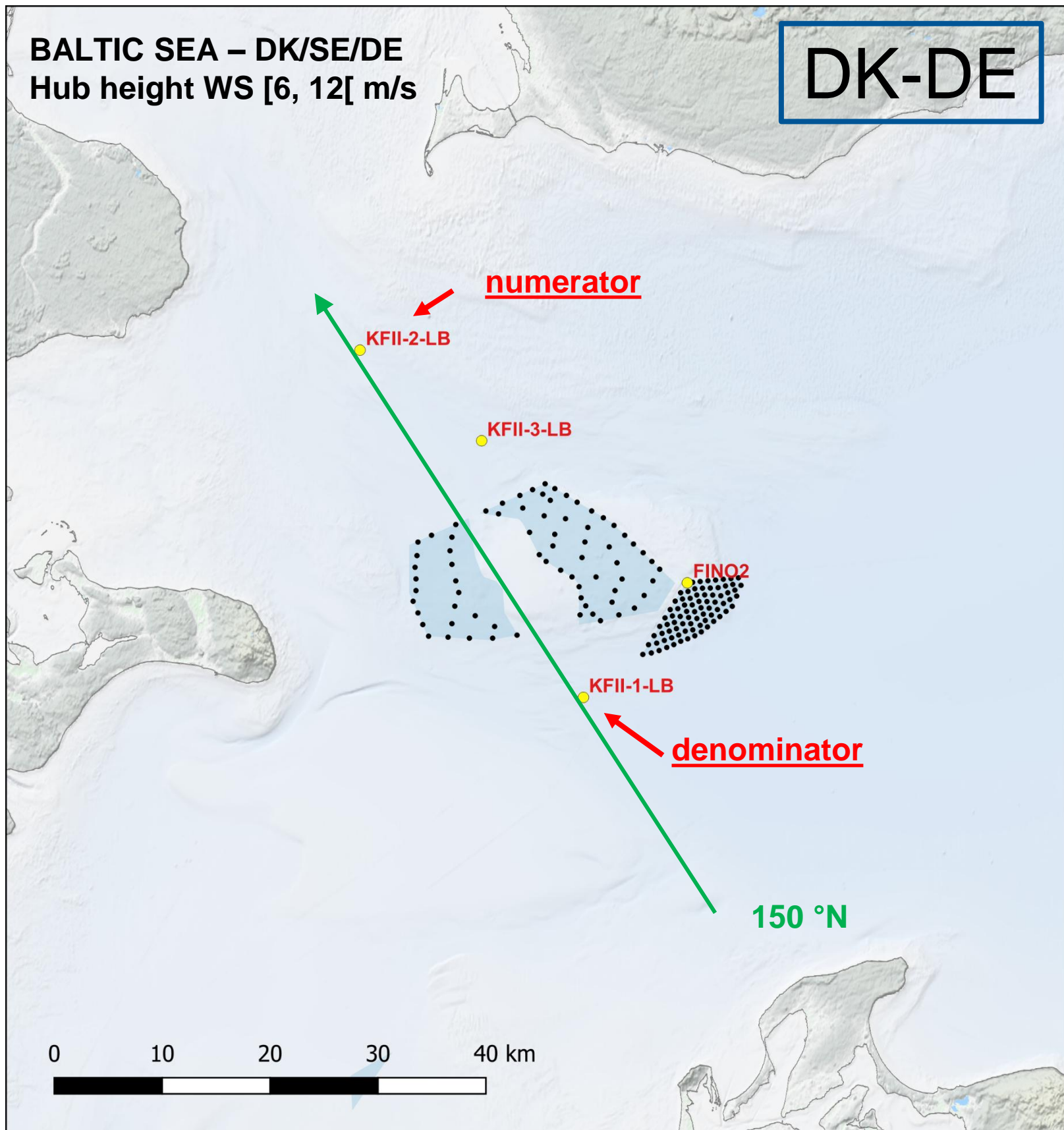


Ⓐ all models perform well Ⓑ Veer and Whiffle better capture stable conditions

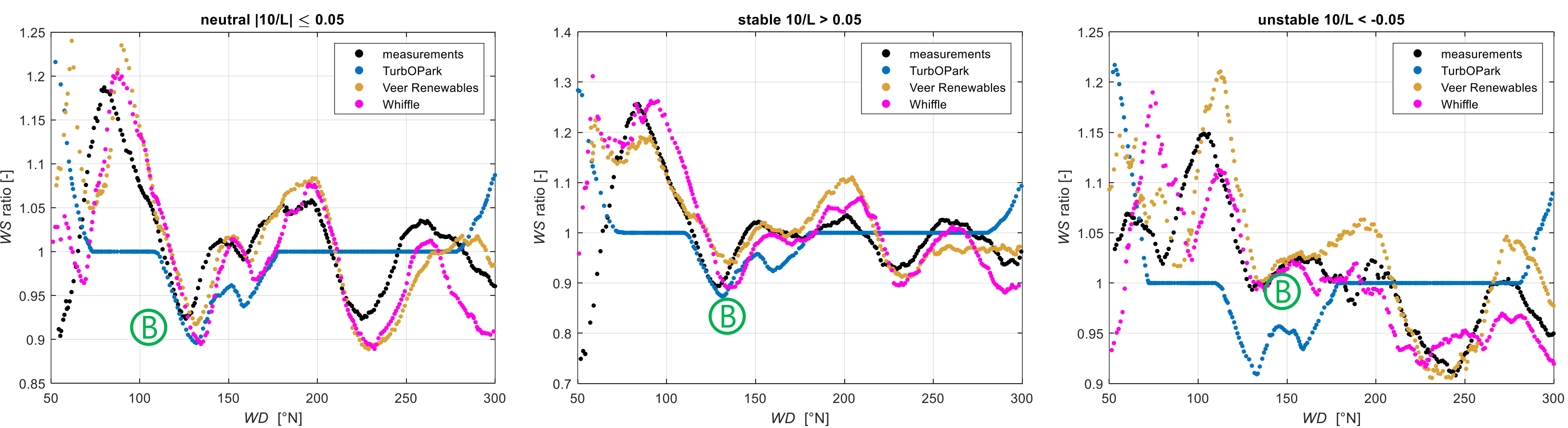


**Legend:**  
Measurements  
TurbOPark  
Veer Renewables  
Whiffle  
(mean, p10 and p90)

mean deficits [%] – all stab.		
	BE	DK-DE
Wind dir. [°N]	[200;270[	[120;150]
Meas.	15.7	4.4
TurbOPark	13.6	6.5
Veer	14.0	2.7
Whiffle	17.0	4.3



Ⓐ large mesoscale variations Ⓑ Veer and Whiffle capture stability + mesoscale effects



Check our **white paper**

- ✓ measurement and model processing.
- ✓ all validation plots.
- ✓ guidance for model selection.