

Validation run 5: Hamburg, wind tunnel

Results

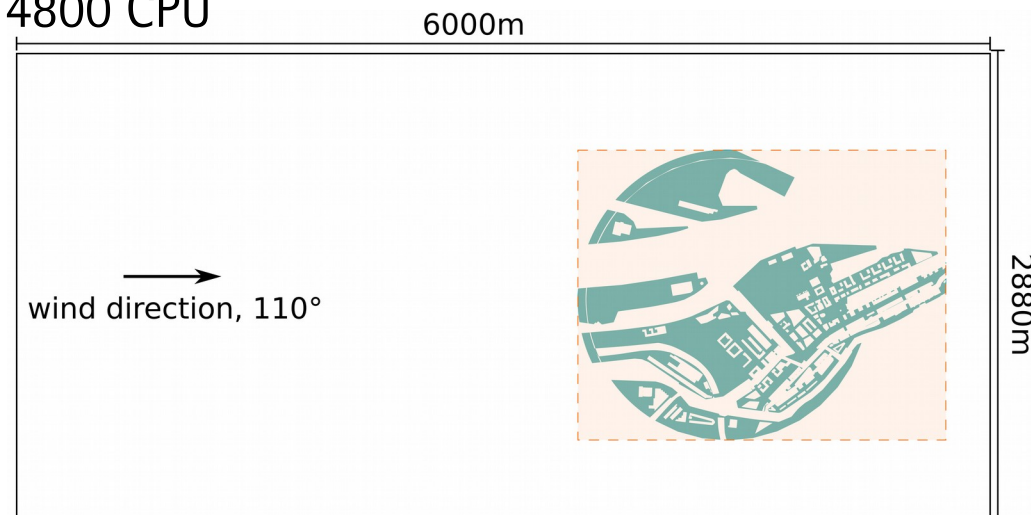


Leibniz
Universität
Hannover

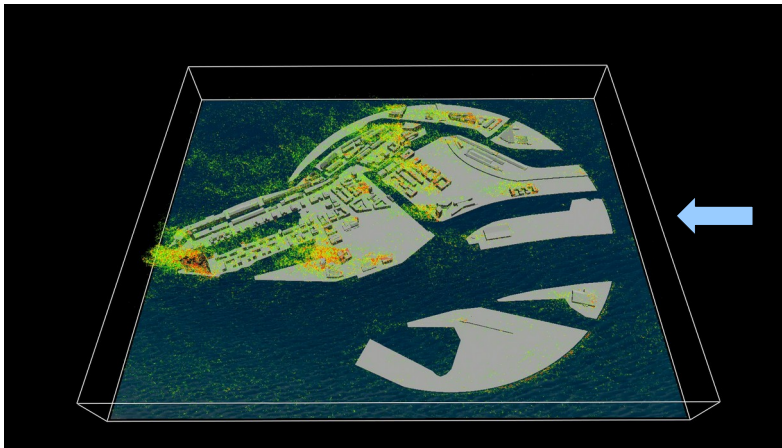
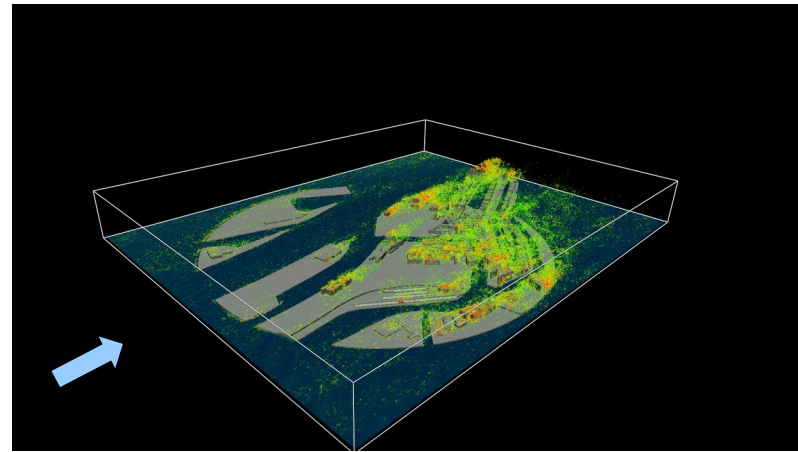
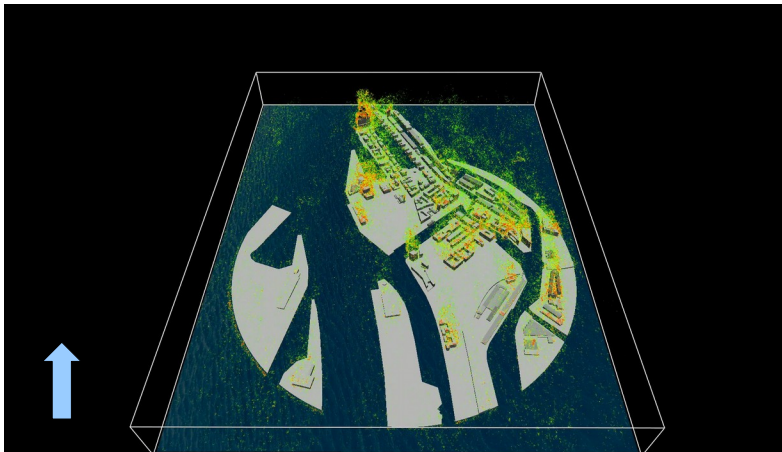


Simulation setup

- Area-of-interest: Hamburg HafenCity
- 6000m x 2880m at 1m resolution
- 10,368 Mio. grid cells
- Mean inflow of 1 ms^{-1} at 60m height from direction 110° according to measurements from wind tunnel
- 6h total simulation time
- >5 days computation time on 4800 CPU



3D visualisation



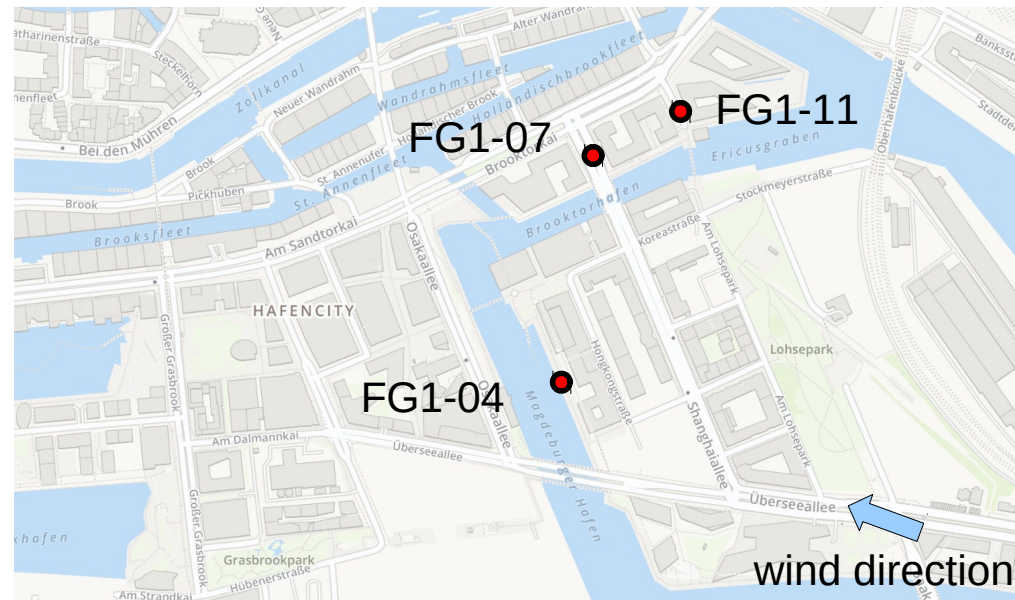
Shown is the turbulence intensity with green and red colours representing low and high values, respectively. Turbulence intensity is only shown in the area-of-interest.

flow direction ←

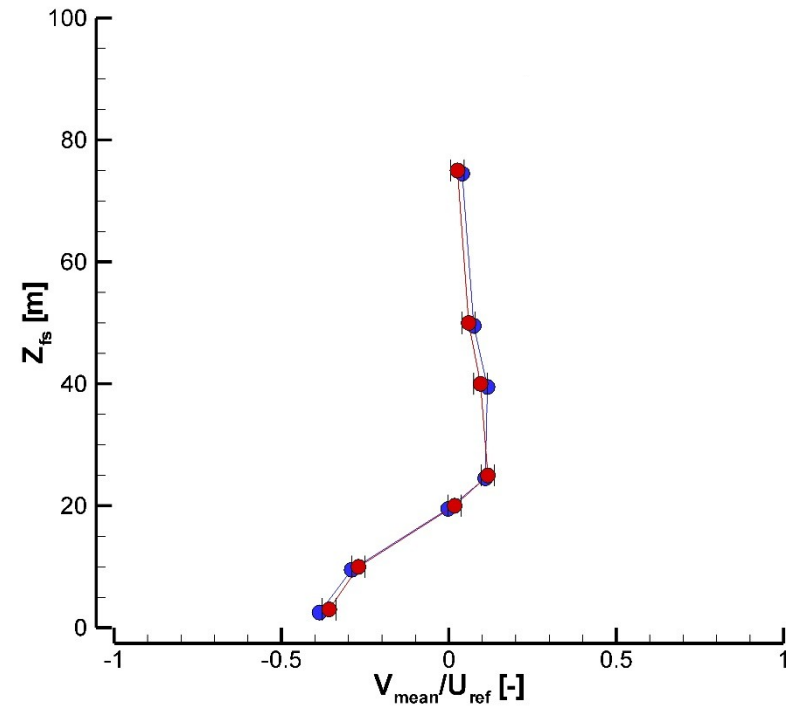
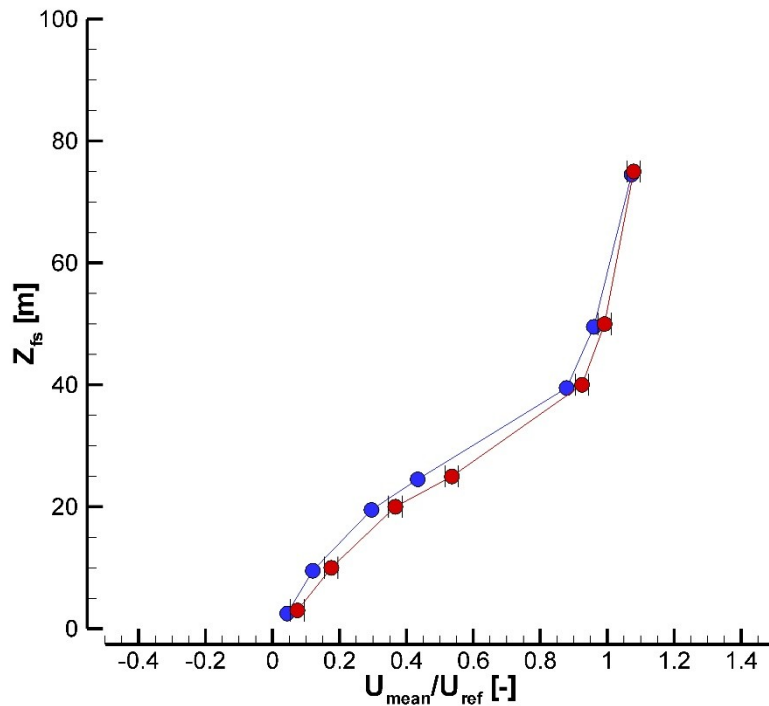
Imagery produced by VAPOR (www.vapor.ucar.edu), a product of the Computational Information Systems Laboratory at the National Center for Atmospheric Research

Comparison between wind tunnel and PALM-4U

- Comparison of time series of wind measurements at several heights at multiple positions (~4100 time series)
- Shown are three examples
 - FG1-04 – good agreement
 - FG1-07 – average agreement
 - FG1-11 – bad agreement



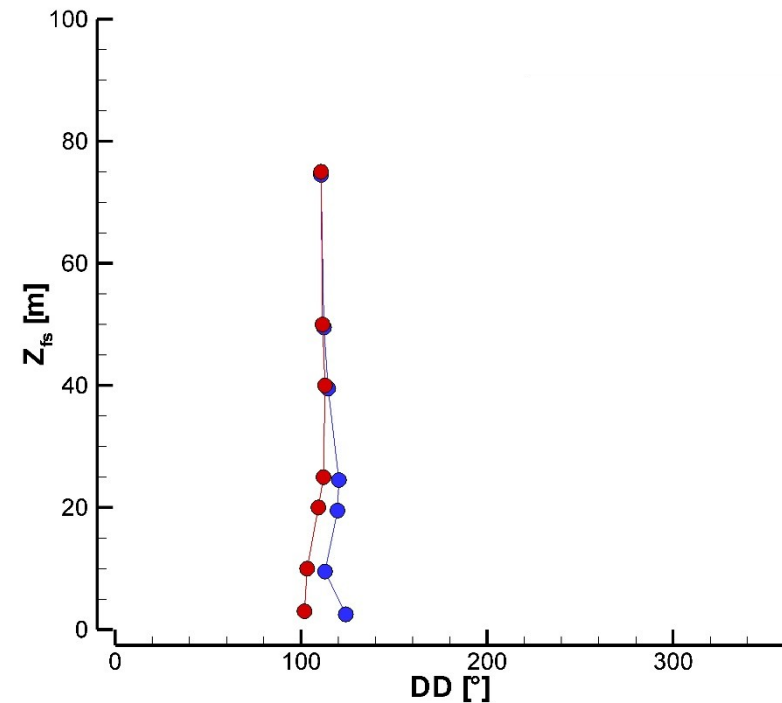
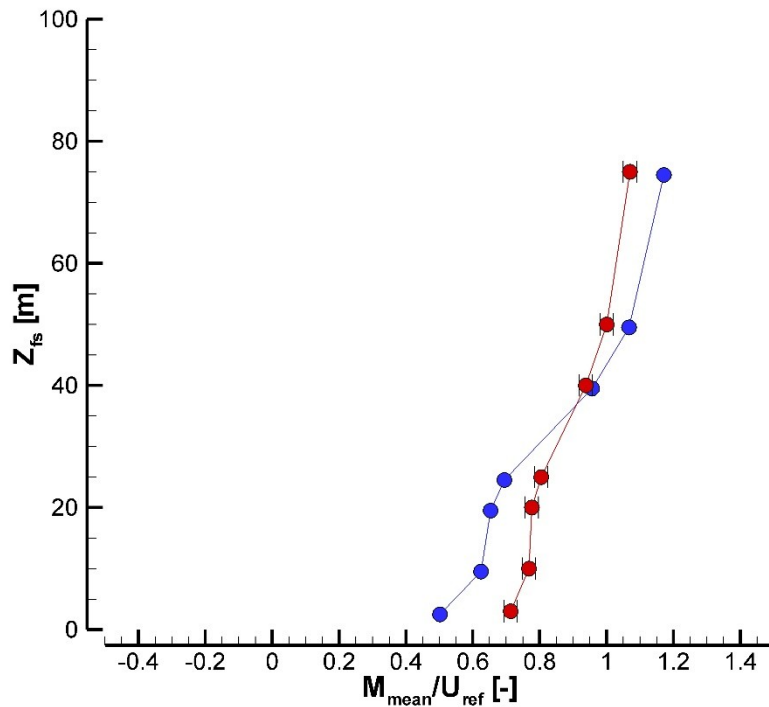
Horizontal wind components



Example of a good agreement (FG1-04)



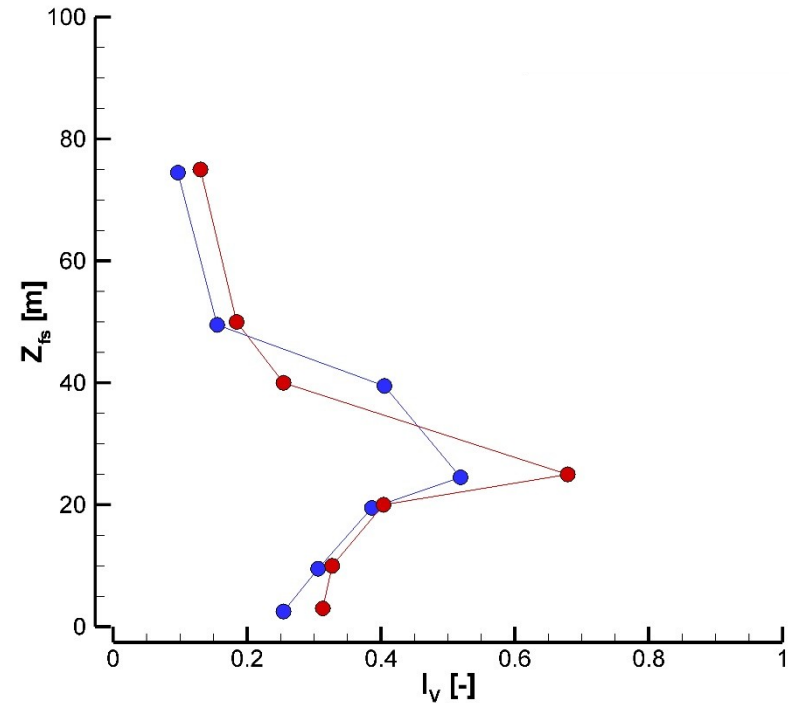
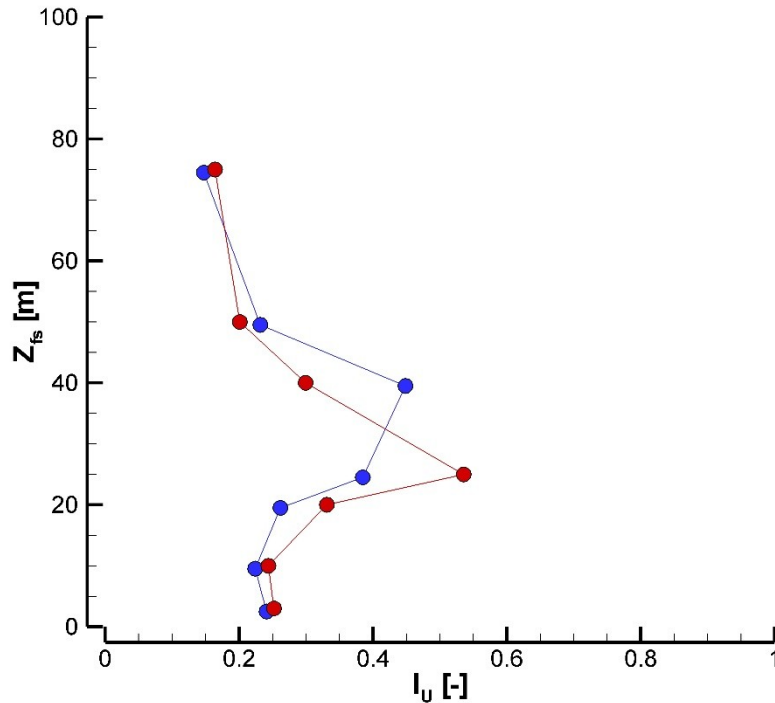
Horizontal wind components



Example of an average agreement (FG1-07)



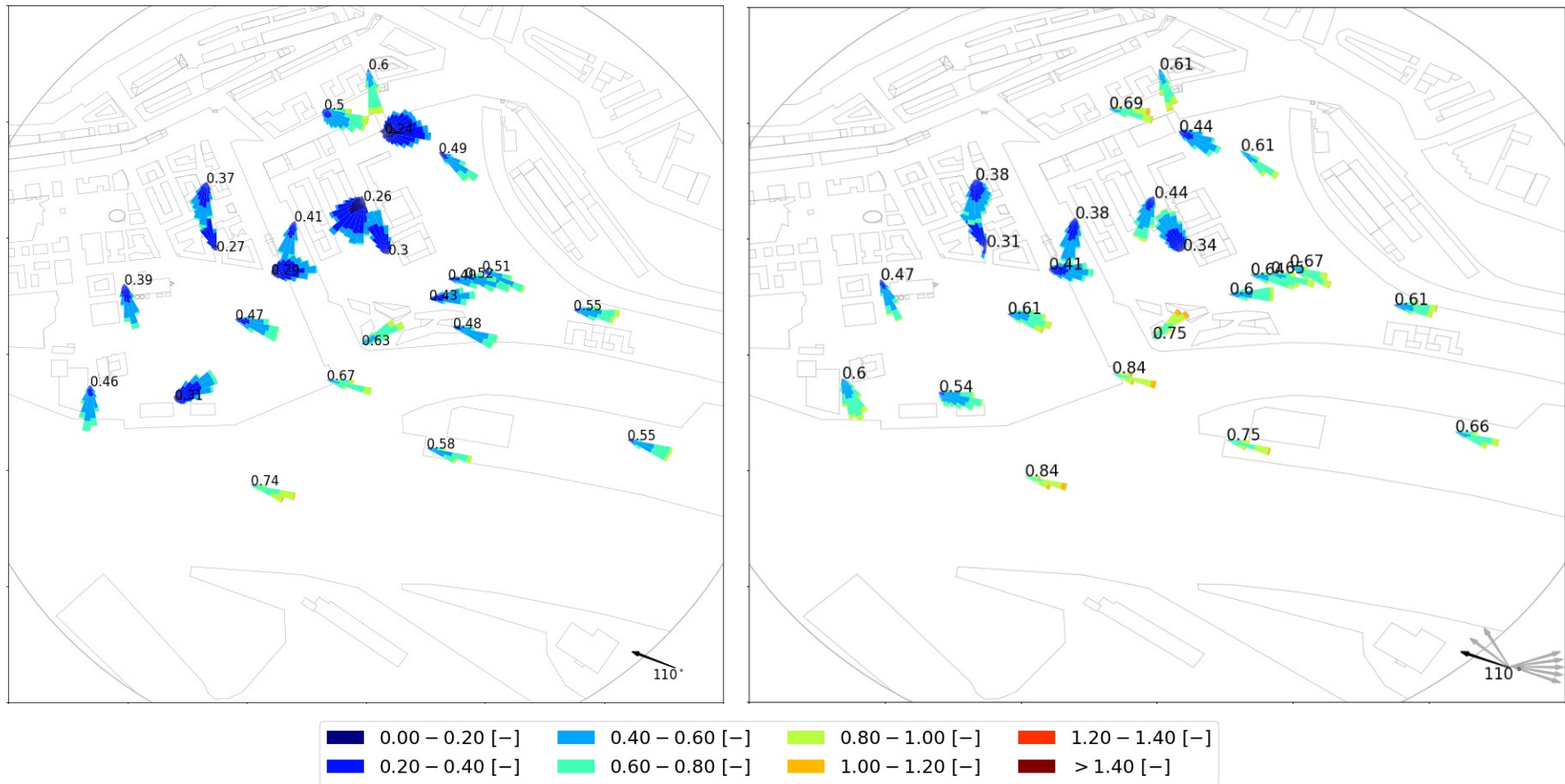
Horizontal wind components



Example of a bad agreement (FG1-11)



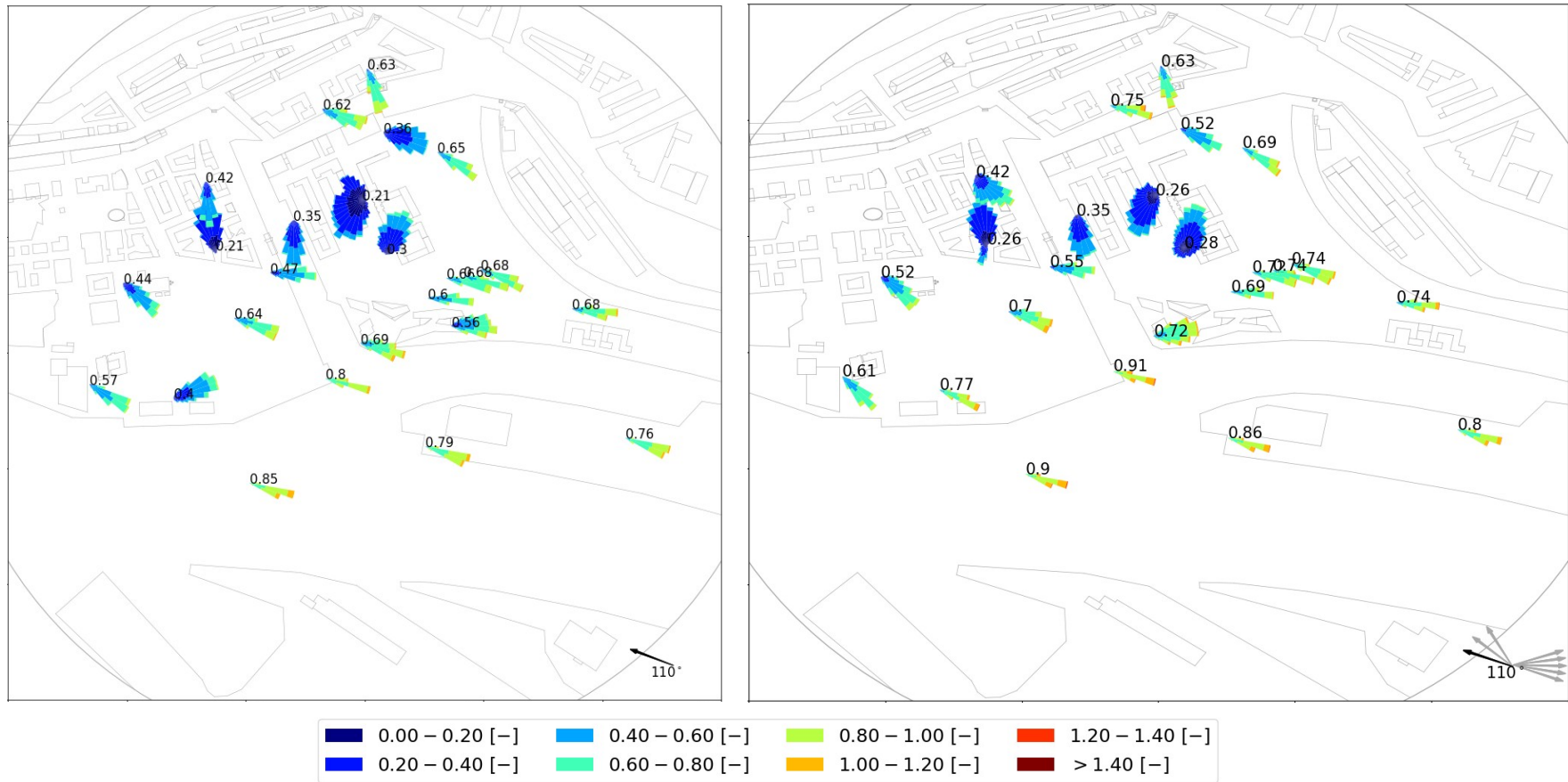
Wind directions at 3m height



PALM-4U

wind tunnel

Wind directions at 10m height



PALM-4U

wind tunnel

Turbulence spectra at 3m height

