**Objectives**

Complex site with two measurement masts have been simulated with CFD models and the results have been compared (Figure 1). The CFD calculations have been performed using the O.F.Wind software package based on OpenFOAM (2)/(3), with Phoenics software (7), and with the WASP-CFD model (4). The comparison of measured and numerically modelled data has been done in terms of mean wind speed and vertical wind profile, additionally, wind resource files for long-term wind speed predictions have been generated. The long-term average wind speed at each wind turbine position was also compared to the linear flow model WASP output.

**Method**

The importance of the selection of the right cases (wind directions) in CFD models is shown in Figure 2. Two scenarios have been considered: First, all the cases (wind directions) has been included in the modeling. Second scenario, cases 30° and 50° has been discarded due to the high turbulence (Table 1) which lead to implausible values on the predictions.

**Results**

The importance of the selection of the right cases (wind directions) in CFD models is shown in Figure 2. Two scenarios have been considered: First, all the cases (wind directions) has been included in the modeling. Second scenario, cases 30° and 50° has been discarded due to the high turbulence (Table 1) which lead to implausible values on the predictions.

**Comparision of the Wind Speed Predictions**

First, a cross-prediction of the measurements with the different models has been performed. Figure 3 and Figure 4 show the prediction of the wind shear by O.F.Wind and WASP-CFD. Similar performance can be observed by both models.

Second, the model performance has been evaluated comparing the extrapolated wind speed at the turbine positions. Figure 5 shows from WT03 to WT06 an overestimation of the wind speed by WASP-CFD in comparison with the other models. As well, the closest wind turbine to the masts, (WT02-close to M2, WT04-close to M1), the WASP-CFD model shows no realistic results in comparison with the extrapolated mean wind speed at hub height at the mast positions.

**Conclusions**

Comparison between measured and modelled wind speed has been performed in one complex site using three different CFD models (Phoenics, O.F. Wind and WASP-CFD). No final conclusion about the best performance of the model can be drawn since only one site has been analysed. For the O.F.Wind software, 31 different flow situation cases have been selected for prediction. 43 cases were calculated, however, several cases had to be withdrawn in particular for the main wind direction due to high turbulence leading to implausible speed up values. The importance of the quality of the measurements and their position on the terrain in order to get good model performance has been drawn from the results of this study. Cross-prediction between measurements is not sufficient to rely on the model performance.

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**References**


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**Figure 1:** Complex site with two measurements and 9 wind turbine positions

**Figure 2:** Wind speed extrapolated to hub height at the wind turbine positions for both scenarios.

**Table 1:** Predicted and input angle and turbulence intensity at the site. Speed up (M2/M1) per sector.

**Figure 3:** Measured and predicted wind shear at M1 using as input M1 and M2 and the O.F. Wind and WAsP-CFD model.

**Figure 4:** Measured and predicted wind shear at M2 using as input M1 and M2 and the O.F. Wind and WAsP-CFD model.

**Figure 5:** Wind speed extrapolated to hub height at the wind turbine positions estimated with O.F. Wind (OF), WAsP11, WAsP-CFD and Phoenics (PH) as input both masts.