

Heather Holmes, Michael Schatzmann, Bernd Leitl

Meteorological Institute, University of Hamburg, Bundesstrasse 55, 20146 Hamburg, Germany 06 April 2011, EGU General Assembly 2011, HS2.21/NP3.13, EGU2011-14086, A270

Introduction

Due to the reliance on numerical models for the economic analysis of wind energy projects a research program is being developed in the European Union to increase the confidence level of modeled results. The overall objective of this program, WAUDIT, is to improve measurement and modeling techniques to reduce uncertainties in power output predictions used in wind resource assessment (Fig 1). Specific to the University of Hamburg, the purpose is to develop procedures for validating models used in wind energy applications.



complete partner listing at www.waudit-itn.eu.

Motivation

- Blind comparisons of numerical model results with field and wind tunnel data
- Large range of power output predictability,^[1] 60% over and 150% under prediction
- TPWind goal, reduce uncertainties to 3%^[2]
- Standardized validation and data collection procedures needed for quality assurance
- Intent is not to rank individual models
- Develop database of experimental data accessible to numerical modelers
- Interdisciplinary research to include all scales of motion, 10m to >100km (Fig 2)

Quality assurance methods for models used in wind energy assessment





Approach (Fig 3)

- . Determine critical parameters in wind energy
- 2. Identify numerical models, required inputs
- 3. Compile existing experimental data (field experiments and wind tunnel)
- 4. Establish guidelines for physical modeling, i.e. wind tunnel experiments
- 5. Select appropriate 'Test Cases' with high quality experimental data
- 6. Develop numerical model evaluation method
- . Provide validation metrics and criteria



Future Work

The objective is for methods to be developed that provide guidance and outline quality check procedures for modelers to ensure consistency and improve the modeled results. Due to the different scales being modeled, varying applications and computational advancements several types of models are implemented. It is expected that each type of model will require separate validation procedures and datasets appropriate for the application. However, to start a general procedure for CFD models with purposed validation metrics will be developed.

References Scientific Research agenda.

[1] Leishman, J.G., 2002. Wind Energy 5, 85-132. [2] European Wind Energy Technology Platform (TPWind). 2008.

Acknowledgements This work has been carried out with funding from the EU FP7-PEOPLE program, under WAUDIT Marie-Curie Initial Training Network.





WAUDIT Wind resource assessment audit and standardization Project Reference: 238576 www.waudit-itn.eu

