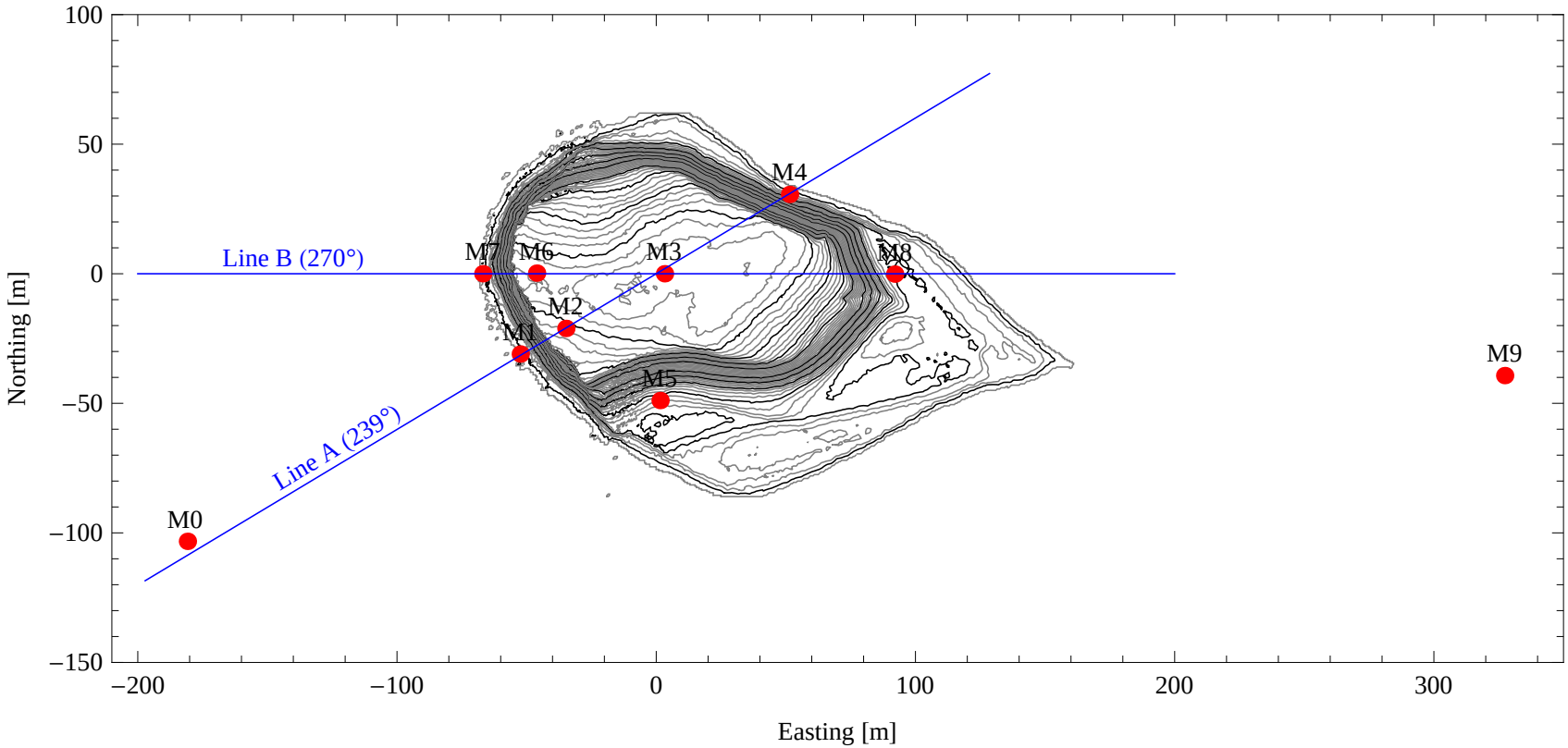
Atmospheric boundary layer and complex terrain

Jakob Mann

November 29, 2010 – DSF Flow center meeting, Risø, Roskilde

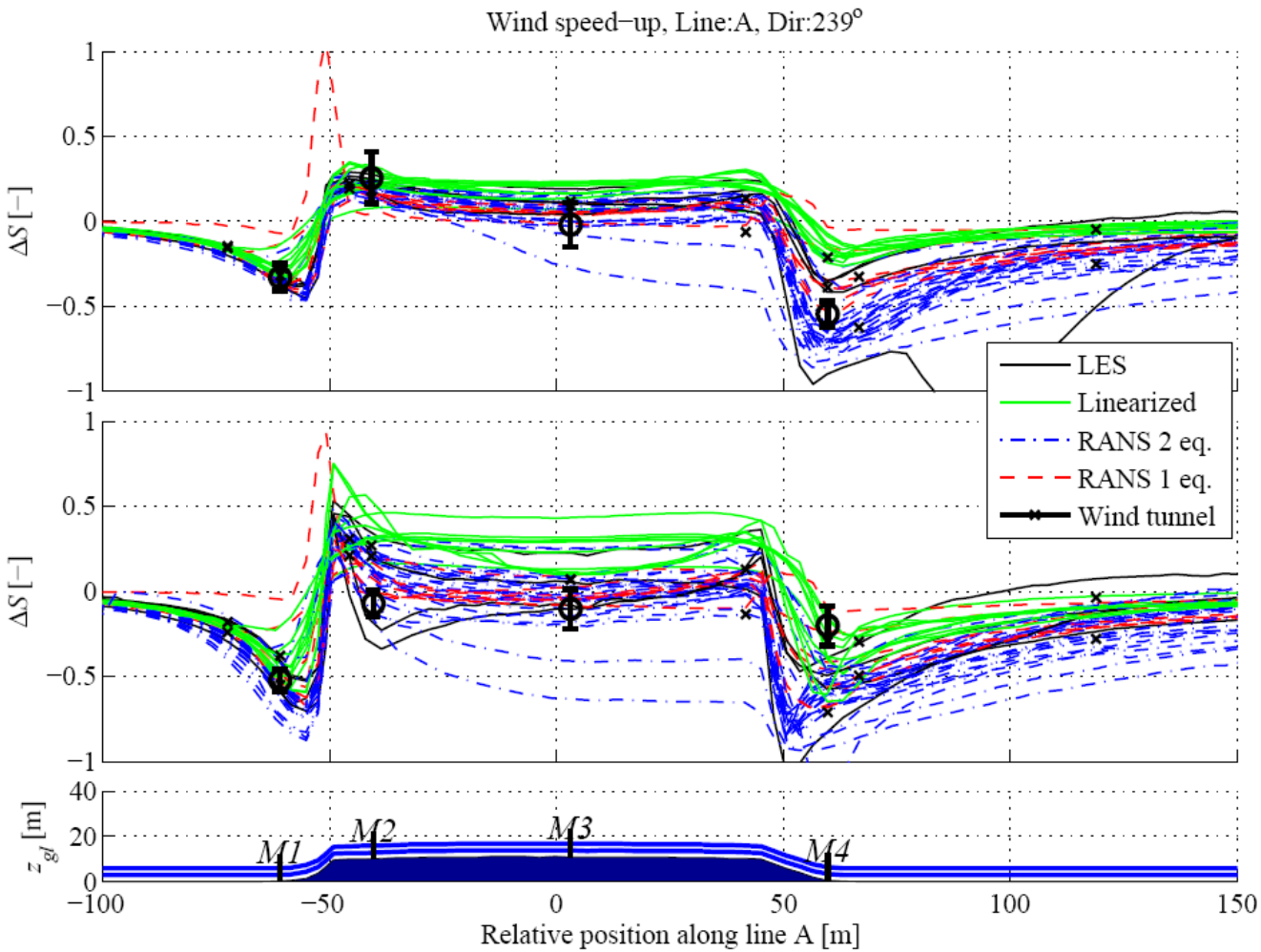
Documentation of the Bolund Experiment

The Bolund Experiment, Part I: Flow over a steep, three-dimensional hill, *BLM*, J. Berg, J. Mann, A. Bechmann, M. S. Courtney, H. E. Jørgensen



Documentation of the Bolund Experiment

The Bolund Experiment, Part II: Blind Comparison of Micro-Scale Flow Models, *BLM*,A. Bechmann · N. N. Sørensen · J. Berg · J. Mann · P-E Rethore



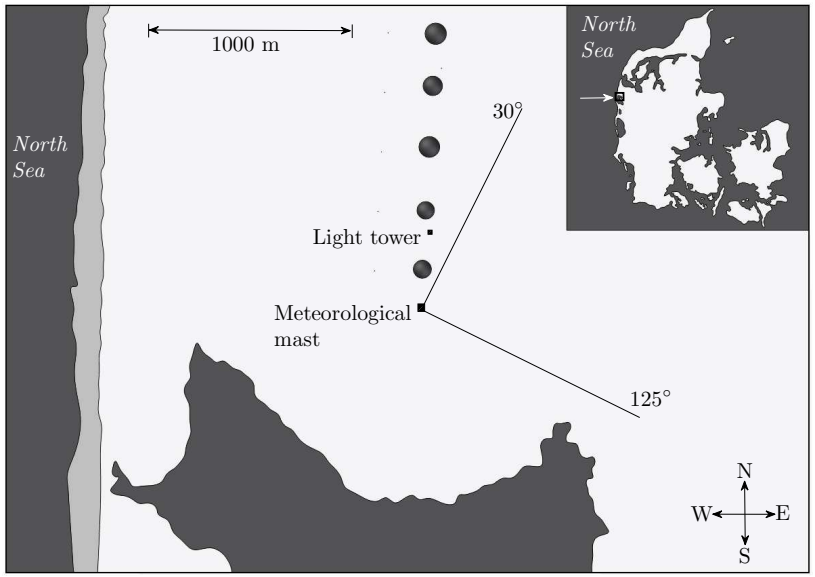
Benakanahalli Experiment Analysis

- 80 m masts in a South Indian hilly landscape
- Report available
- Weak winds

Spectra and length scales

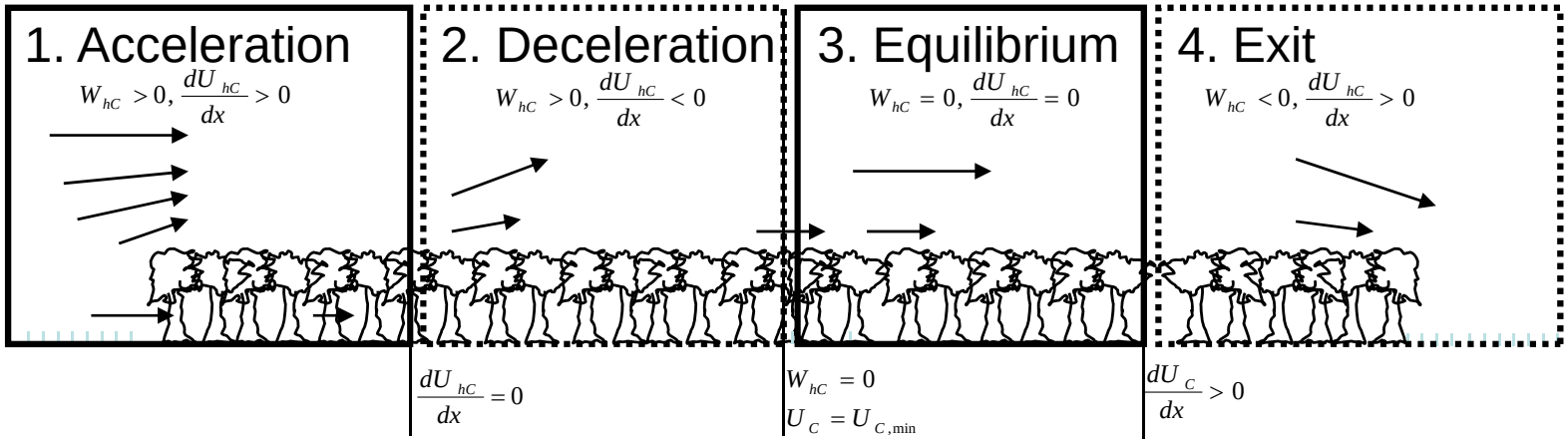
On the length scale of the wind profile, *QJRMS* 2010, A. Peña, S. Gryning and J. Mann

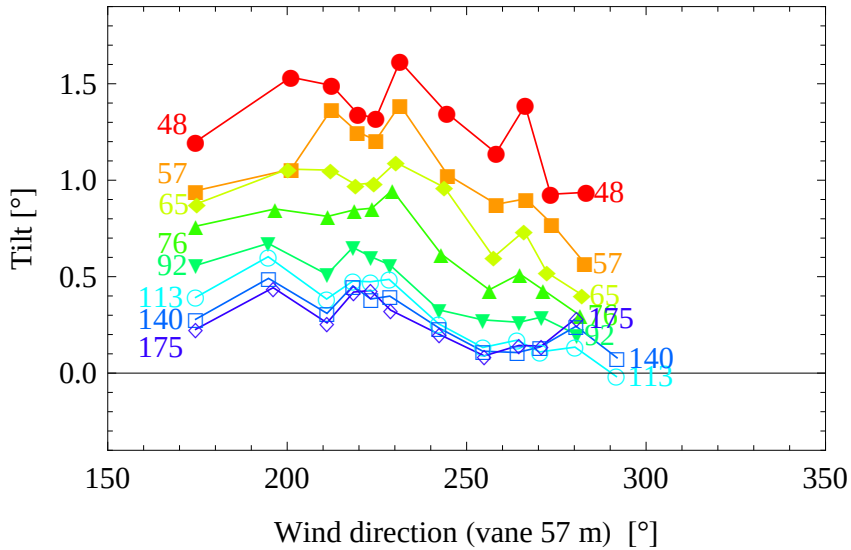
- Neutral spectral tensor model fitted to Høvsøre data with varying stability
- Mixing lengths and spectral length scales compare well
- Models of the mixing lengths height dependence tested



Flow tilt angles

Flow tilt angles near forest edges – Part 1: Sonic anemometry, Part 2: Lidar anemometry, *BioGeoSciences* 2010 E. Dellwik, J. Mann, F. Bingöl and K. S. Larsen





Flow over and around forests

- Implementation and testing of SCADIS canopy code in EllipSys3D (Andrey Sogachev, Boris Gudiksen + AED)
- Revise paper on the Falster forest edge experiment (Ebba Dellwik, Ferhat Bingöl)
- Analyze turbulence from the Falster experiment (Ebba + Jakob + Andrey)
- Analyze and model flow over Østerild in more detail (Ebba + Andreas Bechmann + PhD student starting 2011)

Stability and complex terrain

- Benakanahalli potentially useful for CFD comparison
- Bolund marginally useful
- PhD student (Tilman Koblitz, funded by WAUDIT) work on atmospheric stability in EllipSys3D

Spectral tensor models

- Extent the RDT theory to include stability (Mark Kelly, Jakob Mann, PhD student Abhijit Chougule)
- Inclusion of the Coriolis force.

Fast, linearized flow models

- Finalize and document wind farm model (Søren Ott, J. Berg)
- Extent to forest canopies
- Exploration of non-linear models through iteration of the linearized models (S. Ott)

EERA workshop on wind conditions

26-28 January 2011, Porto, Portugal

Main points of the workshop

- A detailed design of a comprehensive set of field-experimental activities to provide a public set of reference data for use by industry and research organizations.
- Research into improvement and optimization of the "model chain" (from global to local scale).
- Based on the above points detailing of a robust methodology for establishment of an improved European Wind Resource Mapping ("European-Wind-Atlas-II") including time variations statistics and uncertainty measures.