

Remote sensing for wind energy at Risø DTU

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Remote sensing - the science of measuring the wind speed with a remotely placed (on the ground, on a satellite, on a wind turbine) sensor is a major research activity at the Wind Energy Department, Risø National Laboratory for Sustainable Energy (Risø DTU). In June 2008, Risø DTU will be the host and organizers for ISARS2008 (<http://www.isars2008.dk/>), a major international conference concerning remote sensing of wind, temperature and aerosols in the lower part of the atmosphere. This is the current culmination of a booming research activity within the group at Risø DTU.

The group's research activities can be broadly divided into activities concerning the development, testing and improvement of commercial LIDARs for wind measurements and activities making original use of the new measurement techniques provided by LIDARs. Both the currently available commercial LIDARs have benefited significantly from testing and feedback provided by the group. We enjoy close and privileged relationships with several lidar companies. Much of the testing takes place at the Risø DTU's Test Station for Large Wind Turbines, situated at Høvsøre, close to the west coast of Jutland. Here we have flat landscape, intensively instrumented meteorological masts and excellent infrastructure that make Høvsøre the busiest and most important remote sensing test site in Europe.

Looking at the group's more novel uses of lidar, the first attempts at wind turbine wake measurements stands as an important highlight. A lidar has been mounted on a turbine nacelle looking backwards into the wake. By scanning the lidar from side-to-side, it is possible to obtain a picture of the wake deficit and an idea about how much the wake meanders. Another important research area concerns the modeling of the wind in forested areas - where many land-based wind turbines are now being installed. A lidar, pointing horizontally over the tree-tops, is being used to measure how the mean speed and turbulence varies as the wind enters or leaves the forest.

A large portion of the group's activities is now focused on developing the first version of a wind scanner. This is possible thanks to an 18 M DKK grant awarded from DTU's Globalization Fund. In many ways the windscanner combines both branches of our remote sensing research - we are building an advanced steerable lidar research tool based on three existing commercial products that we have helped to develop.