



TEXAS TECH UNIVERSITY
National Wind Institute

Wednesday, November 11, 2015
1:30 p.m. to 3:00 p.m.
Civil Engineering Room 205
Reception to follow

The McDonald-Mehta Lecture Series Presents:

Downwind Impacts of Wind Energy: Measurements and Simulations of Wakes

Julie K. Lundquist

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Abstract:

With tremendous growth in wind energy in the United States and globally, questions regarding the meteorological impacts of wind energy have grown. Wind turbines extract energy from the incoming flow, generating a “wake,” or region behind the rotor characterized by reduced wind speed and increased turbulence. These reduced wind speeds undermine the power generation of downwind wind turbines, while the enhanced turbulence within the wake causes increased fatigue loads on downwind turbines. Wind farms can be optimized by wake manipulation, but such approaches require predictive tools that incorporate the rapidly-growing body of knowledge of the dependencies of wind turbine wakes on atmospheric stability and wind variability.

Our group has observed turbine wakes from multi-MW turbines with profiling lidar, scanning Doppler lidars, towers, and a tethered lifting system. We have also developed methods for representing the effects of clusters of wind turbines in mesoscale and large-eddy simulation models, and use these observational datasets to validate and improve these simulation capabilities. This presentation will characterize wind turbine wakes based on our observations and present simulations of potential regional impacts of wind farms.

Short Biography of Speaker:

Professor Lundquist leads an interdisciplinary research group in the Dept. of Atmospheric and Oceanic Sciences, University of Colorado, with a joint appointment at the National Renewable Energy Laboratory. Her research group uses observational and computational approaches to understand atmospheric influences on turbine productivity, turbine wake dynamics, and downwind impacts of wind energy. Before joining CU-Boulder, Dr. Lundquist designed and led wind energy projects at Lawrence Livermore National Laboratory. Her Ph.D. is in Astrophysical, Planetary, and Atmospheric Science from CU-Boulder, as is her M.S. degree. She studied English and Physics as an undergraduate at Trinity University, San Antonio, Texas. She has authored or co-authored over 40 refereed publications and over 100 conference presentations.