

Boulder Fluid Dynamics Seminar Series

Tuesday, April 15, 2014

3:30pm-4:30pm (refreshments at 3:15pm)

Bechtel Collaboratory in the Discovery Learning Center (DLC)

University of Colorado at Boulder

A 30 Historical Year Analysis of the California Current Circulation using 4-Dimensional Variational Data Assimilation

Andrew Moore,

University of California, Santa Cruz

The Regional Ocean Modeling System (ROMS) 4-Dimensional Variational (4D-Var) data assimilation system has been used to compute a three decade long sequence of analyses of the ocean circulation along the U.S. west coast. A brief overview of the ROMS 4D-Var system and the circulation variability in the resulting analyses will be presented.

Wind turbine wake characterization with remote sensing and computational fluid dynamics

Matthew Aitken,

University of Colorado, Boulder

Wind farm wake modeling, and hence turbine layout optimization, currently suffer from an unacceptable degree of uncertainty, largely because of a lack of adequate experimental data for model verification. Here, we analyze wake measurements taken with long-range scanning lidar in two separate experiments, one at the National Wind Technology Center (NWTC) and the other at a wind farm in the western United States.

The presentation outlines a set of quantitative procedures for determining critical parameters from these extensive datasets—such as the velocity deficit, the size of the wake boundary, and the location of the wake centerline—and the results are categorized by ambient atmospheric conditions. Despite specific reference to lidar, the methodology is general and can be applied to extract wake characteristics from other remote sensor datasets, as well as output from numerical simulations. Experimental results are compared to a large eddy simulation (LES) of a turbine operating in the stable boundary layer using the actuator disk parameterization in the Weather Research and Forecasting (WRF) Model.