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Short-term Wind Forecasting at Wind Farms located on Mountainous Terrains

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Power uncertainty and fluctuations are recognized as major challenges for expanding wind energy. Here we aim at better understanding and characterizing fluctuations in wind power caused by rapid changes in wind resource. By means of Large Eddy Simulations (LES), we expect to gain new knowledge about the sources of spatial and temporal variability of wind fluctuations such as different configurations of wind turbines and complex topography. We will present the recent progress on our LES simulations for a wind farm located near a mountainous terrain. We performed multi-scale simulations using WRF's different Planetary Boundary Layer (PBL) parameterizations as well as Large Eddy Simulation (LES). WRF ensembles with different PBL parameterizations showed little spread for wind speed forecasts. LES models improved the forecasts. Statistical error analysis is performed and ramp events are analyzed.