



THE UNIVERSITY OF
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Department of Statistics

MASTER'S THESIS PRESENTATION

BO LUAN

Department of Statistics
The University of Chicago

Surface Wind Modeling and Forecasting in North Slope Alaska

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ABSTRACT

We analyze surface horizontal winds measured every minute from March 1998 to October 2003 at 2, 10, 20 and 40 m in the North Slope of Alaska. We find that a fractionally differenced vector ARMA model provides a good description of the correlation structure in the data. A multivariate GARCH model is then adopted to work with heteroscedasticity in the innovations. Here we use the Dynamic Conditional Correlation GARCH model (DCC-GARCH) introduced by Engle in 2001. For wind predictions, we propose an adjusted best linear predictor (BLP) based on the assumption of local stationarity, and discuss a way to determine the number of previous observations that yields the best minute-ahead predictions. We also propose a way to calibrate the prediction intervals. Finally, we study the correlation structure between the wind components at multiple heights and its effect on estimation and prediction. Some statistical results in the analysis are also explained by physical and meteorological principles.

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