

McMASTER UNIVERSITY
GRADUATE PROGRAM IN STATISTICS

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| STATISTICS SEMINAR |
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Speaker: Dr. Yulia Gel, Department of Statistics and Actuarial Science,
University of Waterloo

Title: *“Calibrated Probabilistic Mesoscale Weather Forecasting:
The Geostatistical Output Perturbation Method”*

Day: Tuesday March 15, 2005

Time: 3:30 - 4:30 PM

Place: HH/217 – Deloitte Colloquium Room (refreshments in
HH/216 at 3:00 PM)

SUMMARY

Probabilistic weather forecasting consists of finding a joint probability distribution for future weather quantities or events. It is typically done by using a numerical weather prediction (NWP) model, perturbing the inputs to the model in various ways, and running the model for each perturbed set of inputs. The result is then viewed as an ensemble of forecasts, taken to be a sample from the joint probability distribution of the future weather quantities of interest. This is typically not feasible for local, or mesoscale, weather prediction carried out by organizations without the vast data and computing resources of national weather centers. Instead, we propose a simpler method of statistical weather ensembles which breaks with the previous practice by perturbing the outputs, or deterministic forecasts, from the NWP model. The random forecast errors are modeled using a geostatistical approach and ensemble members are

generated by simulating realizations of a stationary Gaussian random field. Our resulting prediction intervals turn out to be well calibrated for individual meteorological quantities; to be sharper, i.e. shorter, than those obtained from approximate climatology (historical data); and to be consistent with the spatial correlation structure of the observations. The approach is illustrated by modeling ensemble weather forecast of surface temperature in the US Pacific Northwest between 2000 and 2002. This is a joint work with A. Raftery and T. Gneiting (University of Washington).

REFERENCES

Gel, Y., A. Raftery & T. Gneiting (2004) "Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method," *Journal of the American Statistical Association* **99**, pp. 575-590.



ABOUT THE SPEAKER. Dr. Yulia Gel is an Assistant Professor of Statistics in the Department of Statistics and Actuarial Science at University of Waterloo. She received her PhD with specialization in stochastic processes from the Department of Mathematics and Mechanics of Saint-Petersburg State University in 2000. Subsequently she spent two years as a post-doctoral Research Associate at the Department of Statistics of University of Washington.

Gel's research interests include time series analysis and forecasting and spatio-temporal modeling with application to weather forecasting and fMRI data. (Picture by UW photographer C. Hughes, 2004).

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