



Wind Speed Verification Quebec City, Canada

3rd Verification Methods Workshop, Reading 2007

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Introduction

- Data Set

- Location/Type

- Wind speed – Quebec, Canada

- Forecasts

- Model guidance – 3hr
- Human forecaster – 3hr

- Observation

- Hourly data

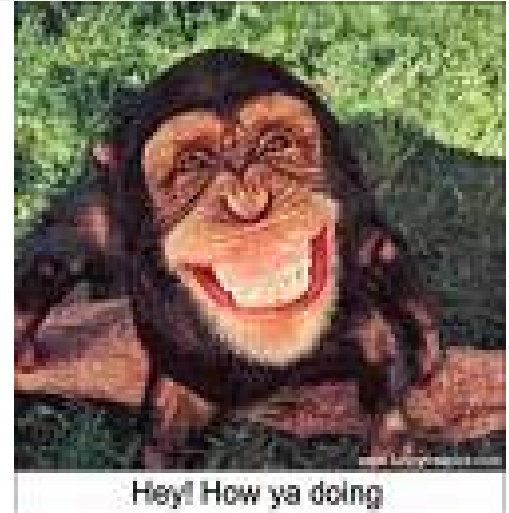
[Introduction]

- Data Issues/Limitations

- Verify against Max or Mean wind speed
- Direction not investigated
- 1 year of data only

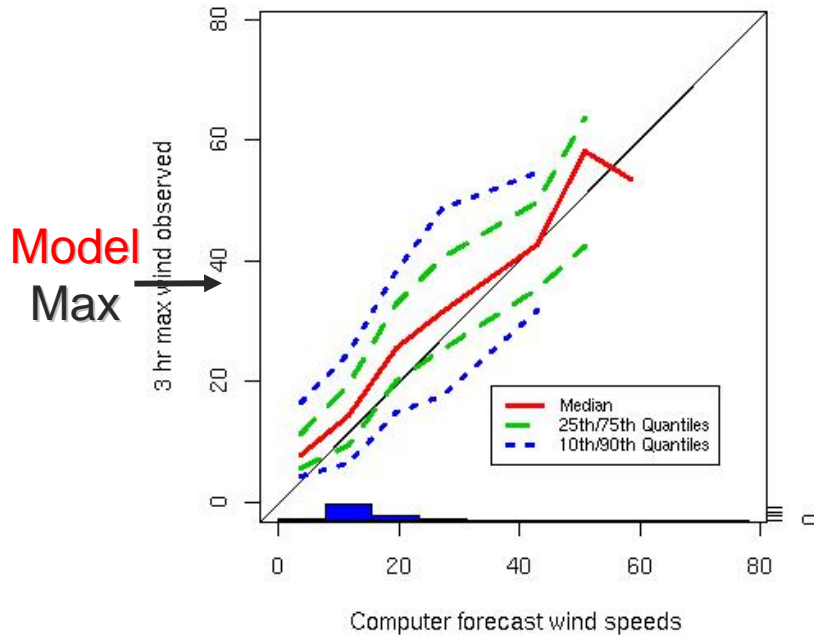
The “BIG” Questions

- Humans > Model?
 - Areas of differences
- Any ideas/strategies for forecaster
 - Or just hire monkeys from now onwards?!
- Lets answer the “BIG” questions



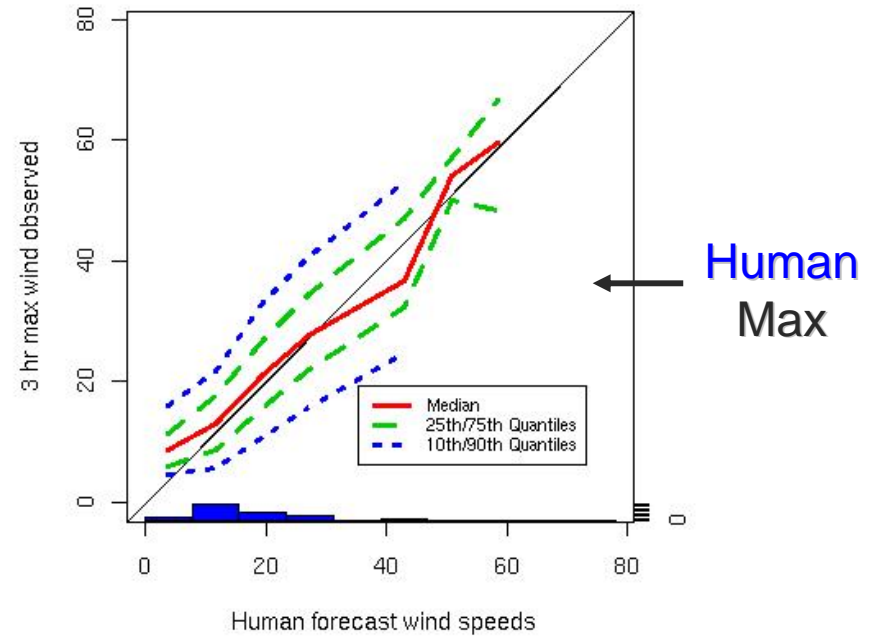
Man vs Machine Models

Conditional Quantile Plot



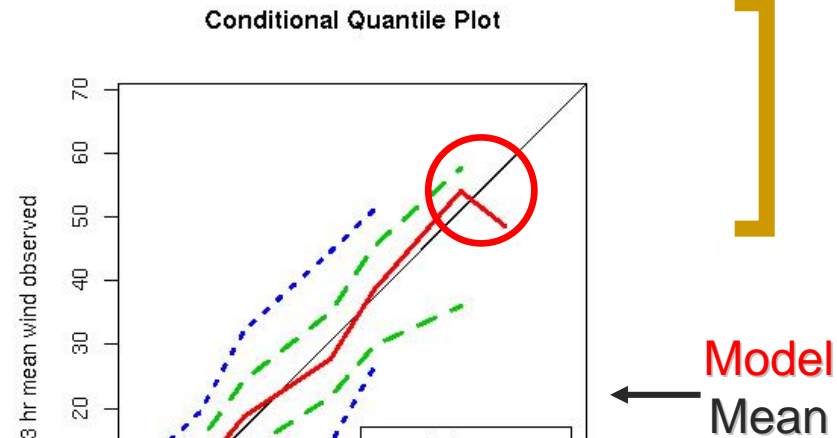
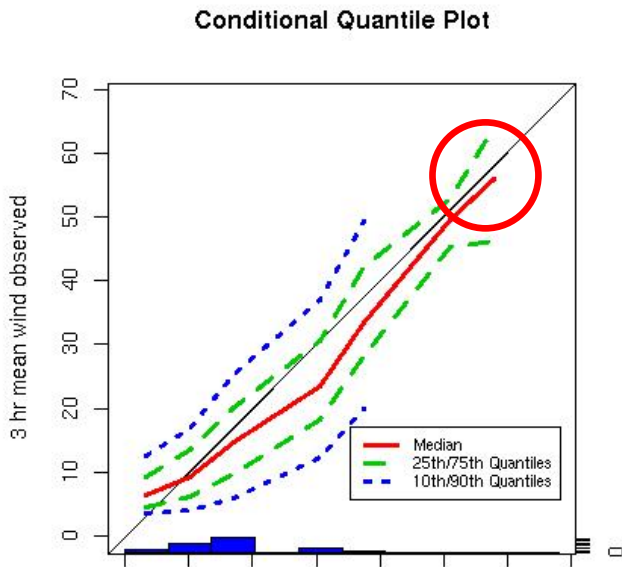
Computer - Max winds	
MAE	6.7
ME	4.1
MSE	79.9

Conditional Quantile Plot

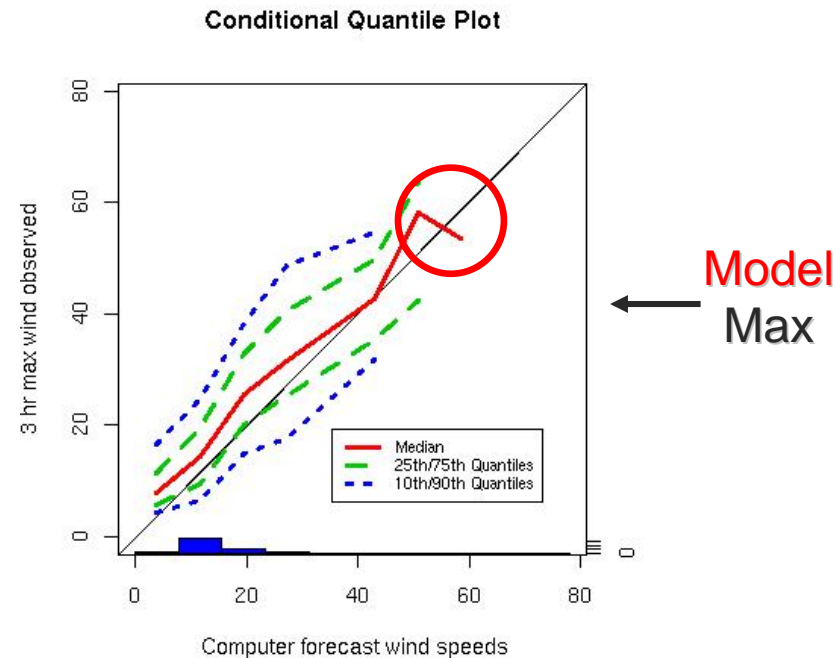
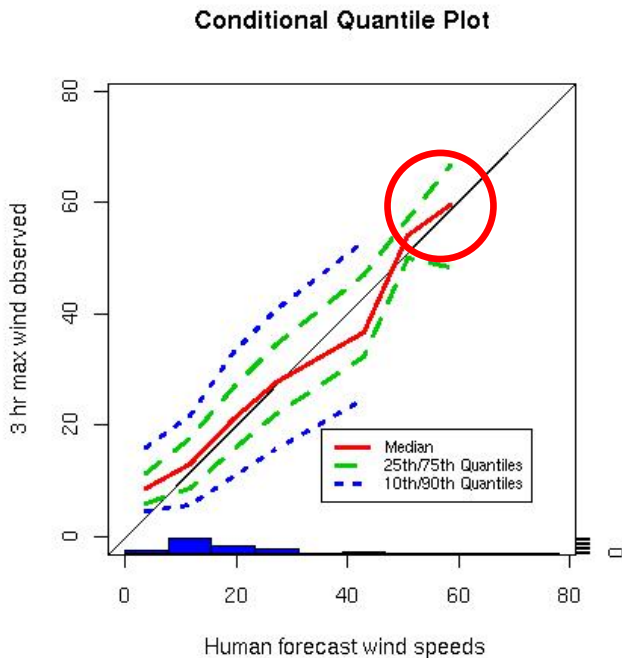


Human - Max winds	
MAE	6.1
ME	1.2
MSE	65.5

Human Mean



Human Max



[Further Analysis - Categorical]

- Reliability plot – good overview
- Drill down into the data
 - Wind speed into 4 levels
 - Lends into 4x4 contingency table
 - Light – <20 km/h
 - Moderate – 20-39 km/h
 - Strong – 40-59 km/h
 - “*Bloody*” strong ie. Severe – >60 km/h

Contingency Tables

Forecaster

Forecast winds	Observed winds				? fcst
	0 - 20	20- 40	40- 60	60+	
0 -20	1450	224	0	0	1674
20-40	399	649	77	3	1128
40-60	7	46	48	2	103
60+	0	2	4	5	11
? obs	1856	921	129	10	2916

	0 - 20	20- 40	40- 60	60+
Bias	0.90	1.22	0.80	1.10
POD	0.78	0.70	0.37	0.50
FAR	0.13	0.42	0.53	0.55

Forecaster	
PC	0.74
PCc	0.49
HSS	0.49

Statistical models

Forecast winds	Observed winds				? fcst
	0 -20	20-40	40-60	60+	
0 -20	1705	430	10	1	2146
20-40	147	477	90	2	716
40-60	4	14	26	5	49
60+	0	0	3	2	5
? obs	1856	921	129	10	2916

	0 - 20	20- 40	40- 60	60+
Bias	1.16	0.78	0.38	0.50
POD	0.92	0.52	0.20	0.20
FAR	0.21	0.33	0.47	0.60

Model	
PC	0.76
PCc	0.55
HSS	0.47

Contingency Tables

Forecaster

Forecast winds	Observed winds				? fcst
	0 - 20	20- 40	40- 60	60+	
0 -20	1450	224	0	0	1674
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Forecaster changes – 1508

657 bad

Discussion/Conclusions

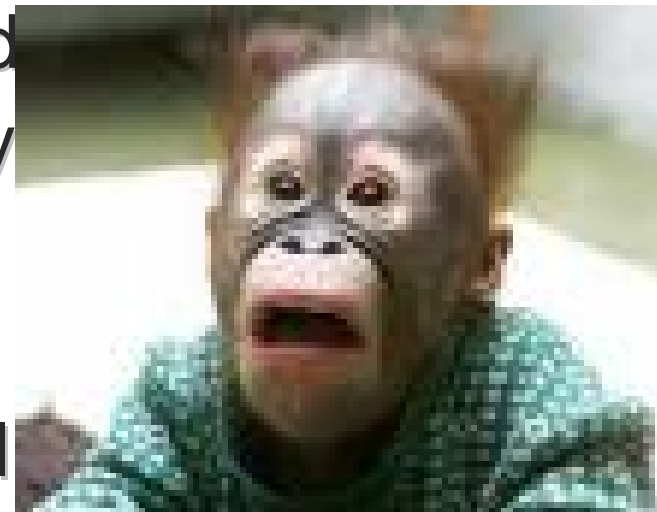
- Humans > Model guidance?

- Strong at higher threshold
- Limited data – 1 year only
- CI needs to be done

- Forecast Strategy?

- Low wind speed -> Model
- Significant speed -> Think!

- Forecasters still needed!



[Further investigation]

- Drill down further
 - Seasonal differences
 - Individual forecasters
- Wind direction
 - Specialist group – marine/energy company

[Audience Participation]

- QUESTIONS?
- Thank you for your time!