

Observations of Vertical Temperature Profiles over the Ross Ice Shelf from Alexander Tall Tower! AWS

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Agenda



Photo: USAP Riggers

- * Alexander Tall Tower!
- * Self Organizing Maps
- * Vertical temperature profiles
- * Vertical wind speed profiles
- * Frequency and seasonality
- * Next Steps

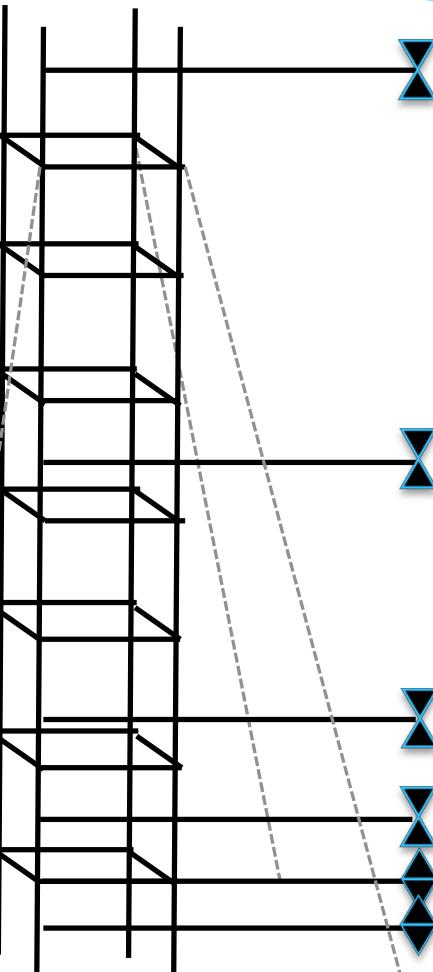
Alexander Tall Tower!



Photo: Jonathan Thom

- * **Installation:** February 2011
- * **Location:** 70.044° S, 170.651° E
- * **Height:** 30 m
- * **Instrumentation:**
 - * Temperature (6 levels)
 - * Wind speed (5 levels)
 - * Wind direction (4 levels)
 - * Pressure
 - * Relative humidity
 - * Shortwave and Longwave fluxes
- * **Time resolution:** 10 min QC'd obs

Configuration



30 m: Aerovane, temp, radiation sensor, & RH

15 m: Aerovane & temp

7.5 m: Aerovane, temp, & RH

4 m: Aerovane, temp, ADG & antennae

2.3 m: Cup anemometer, temp & pressure

1.3 m: Cup anemometer & temp

Self Organizing Maps

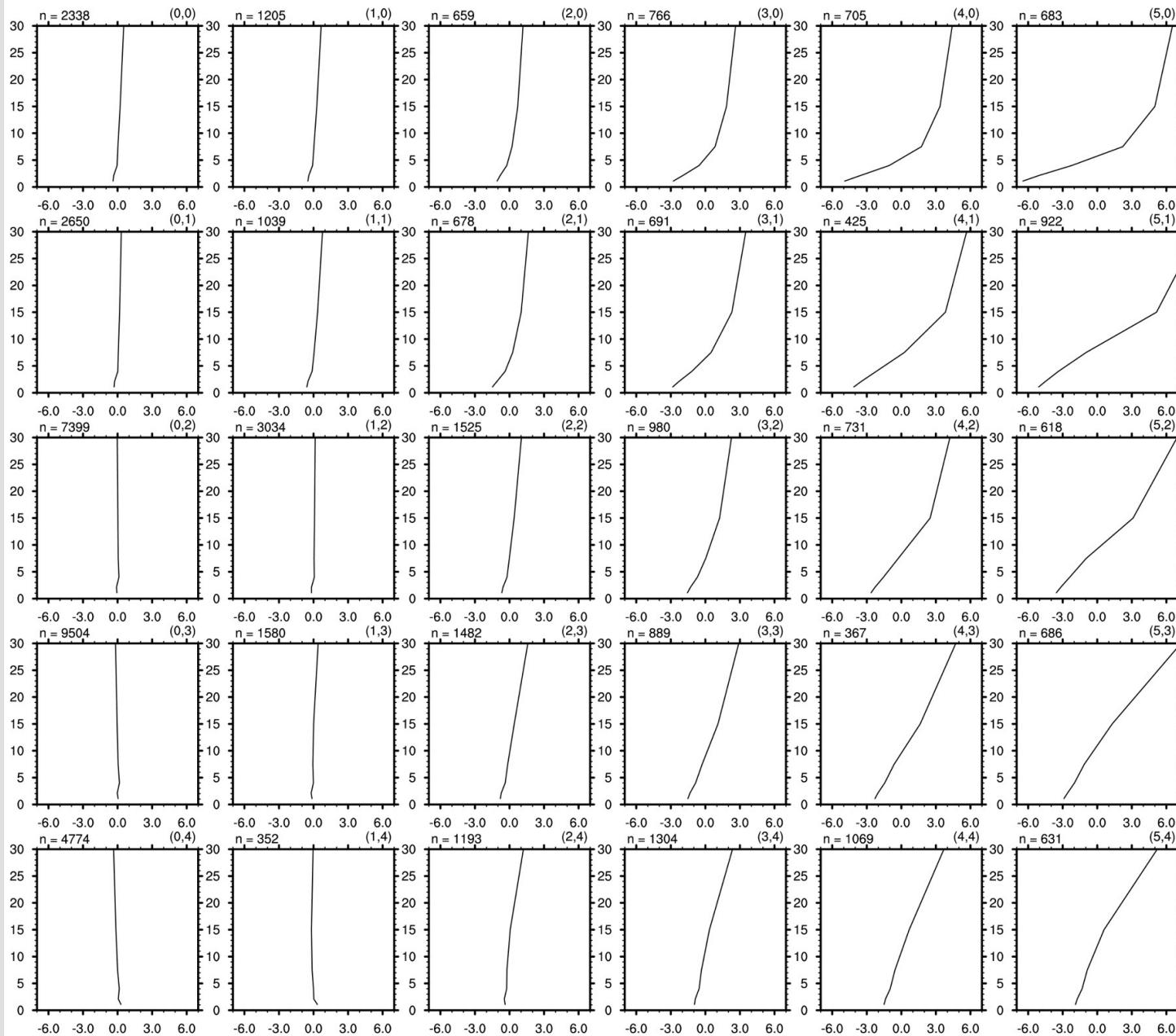
- * **Technique**

- * Neural network algorithm
- * Unsupervised, iterative learning process
- * Identifies user specified number of patterns within a dataset

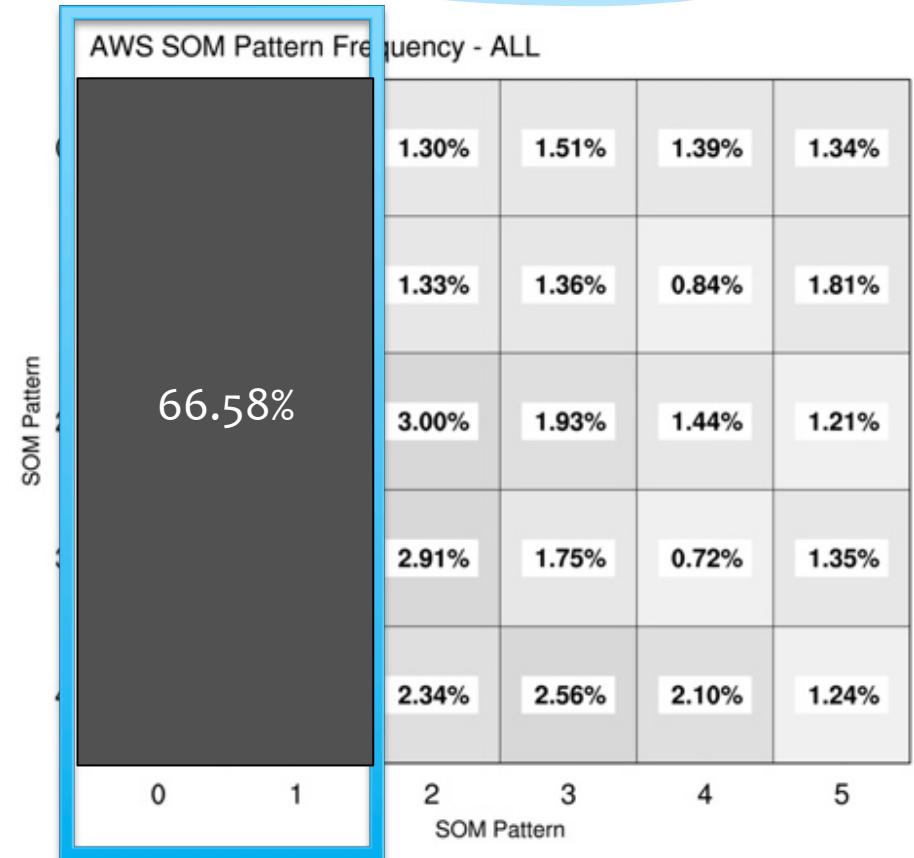
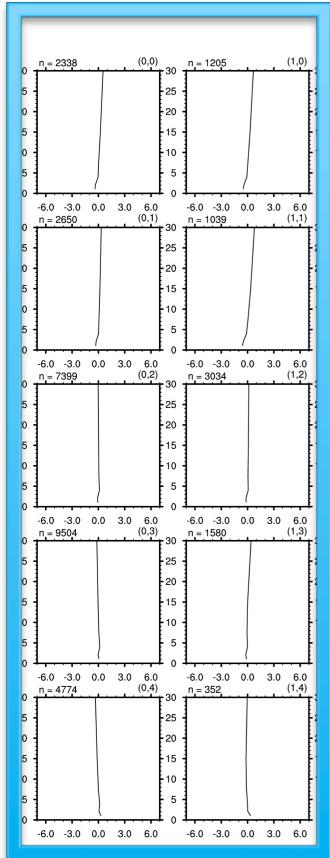
- * **Training**

- * Alexander Tall Tower! temperature observations
- * 10 min QC'd observations
- * February 2011 – January 2012

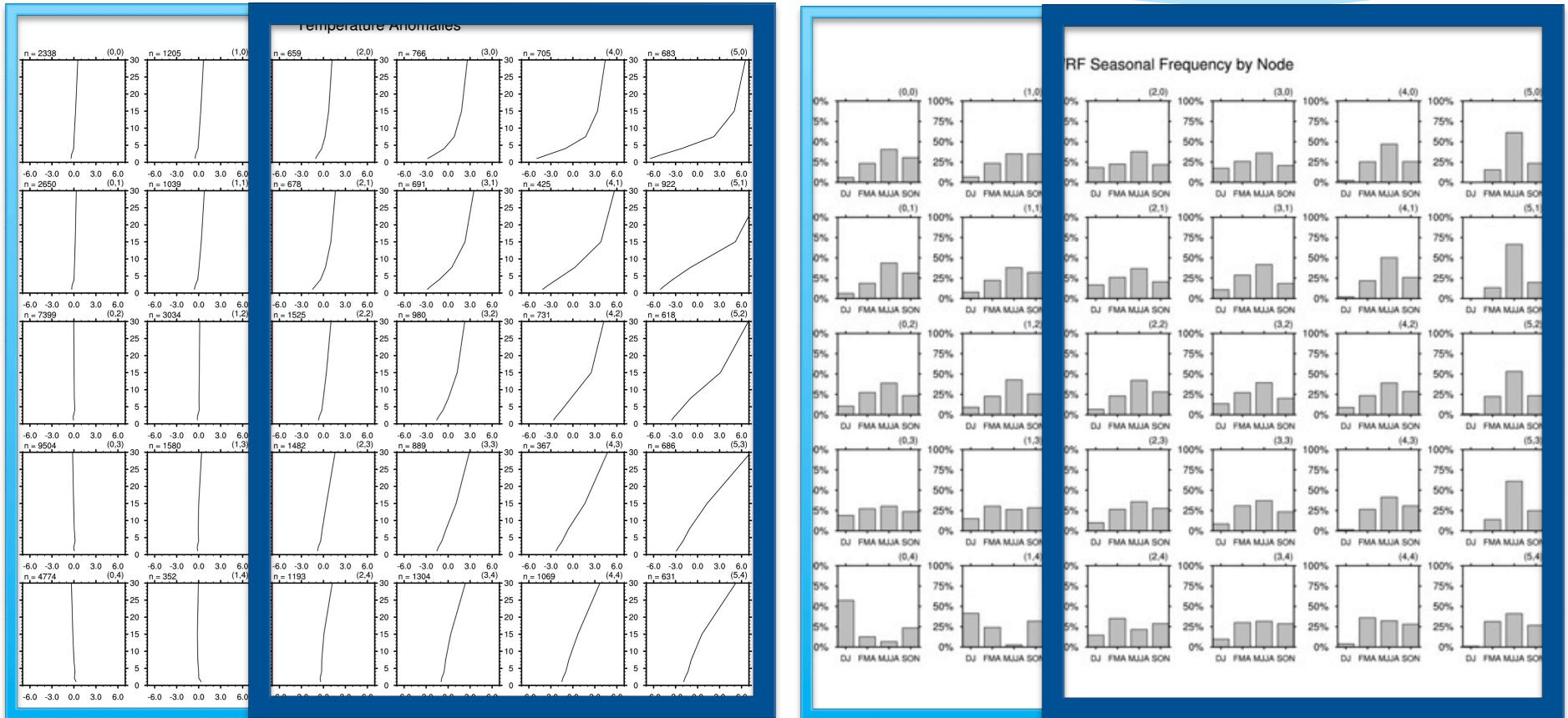
Temperature Anomalies



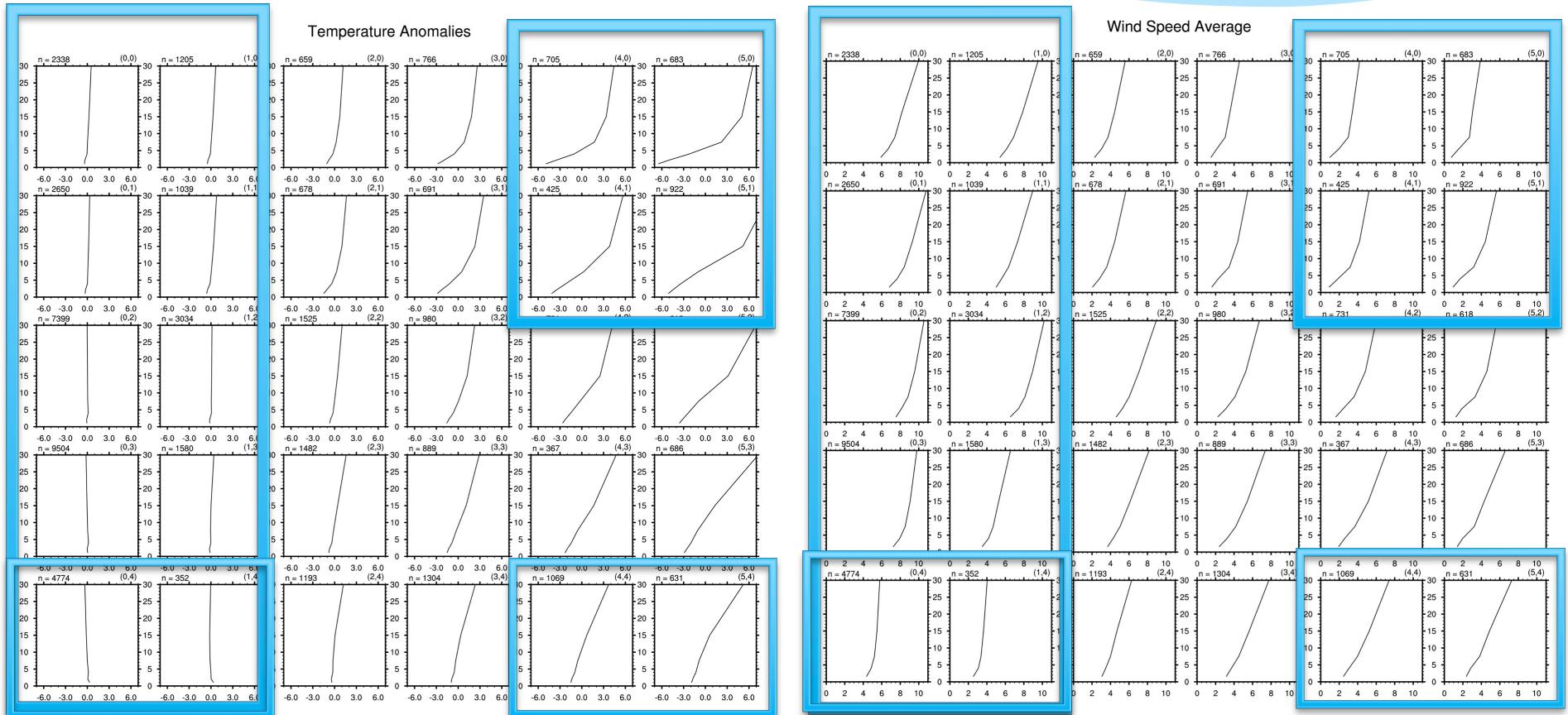
Temperature & Frequency



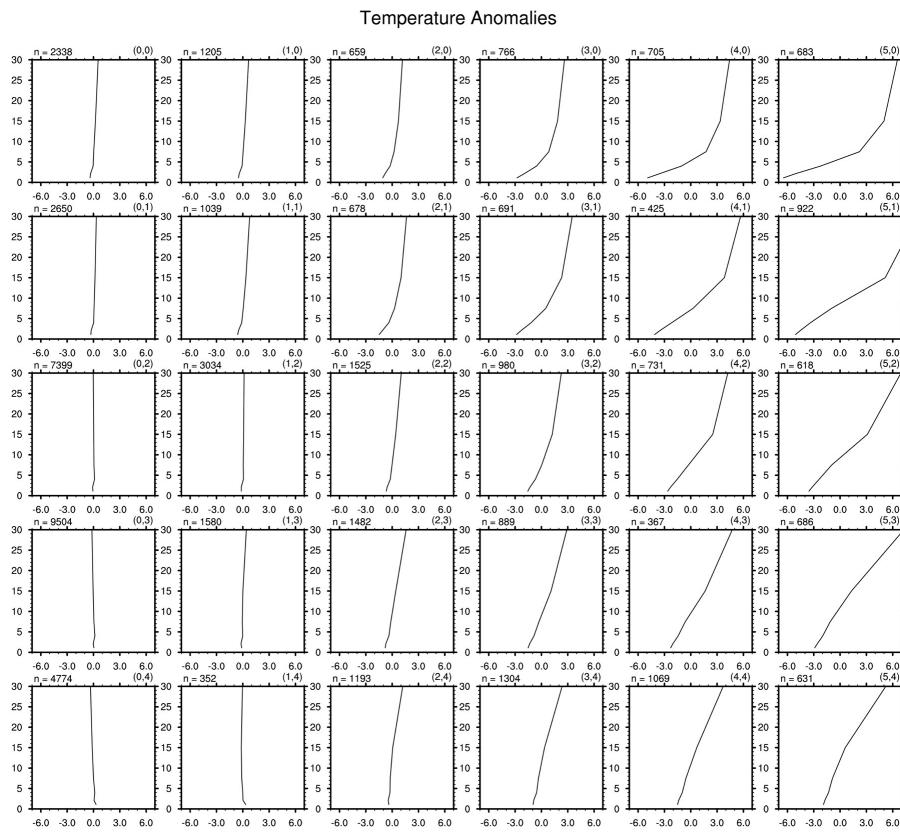
Temperature & Seasonality



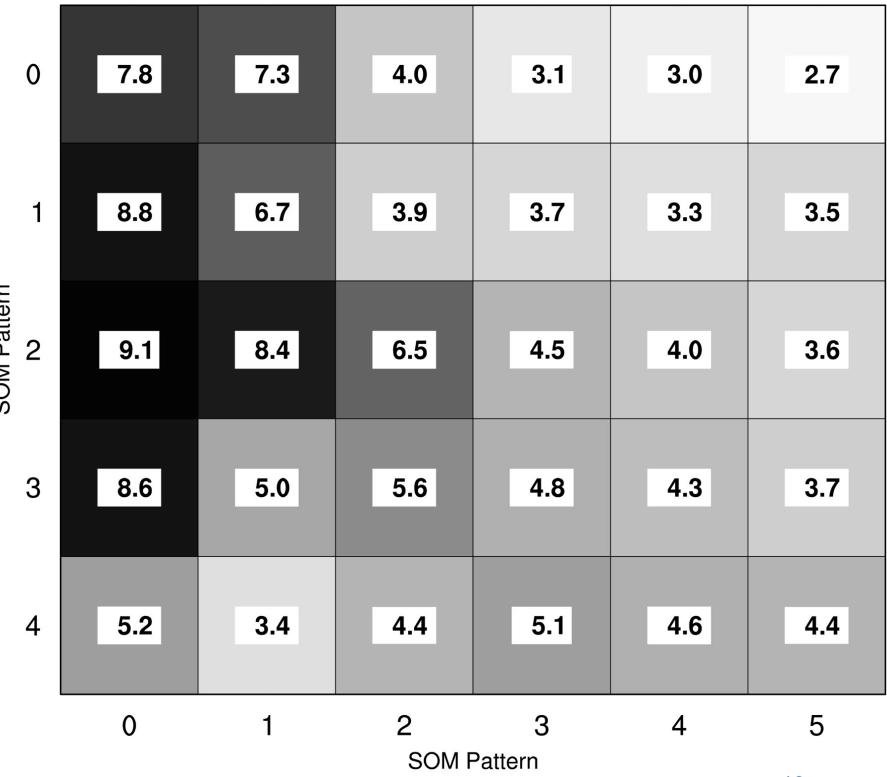
Temperature & Wind Speed



Temperature & Wind Speed

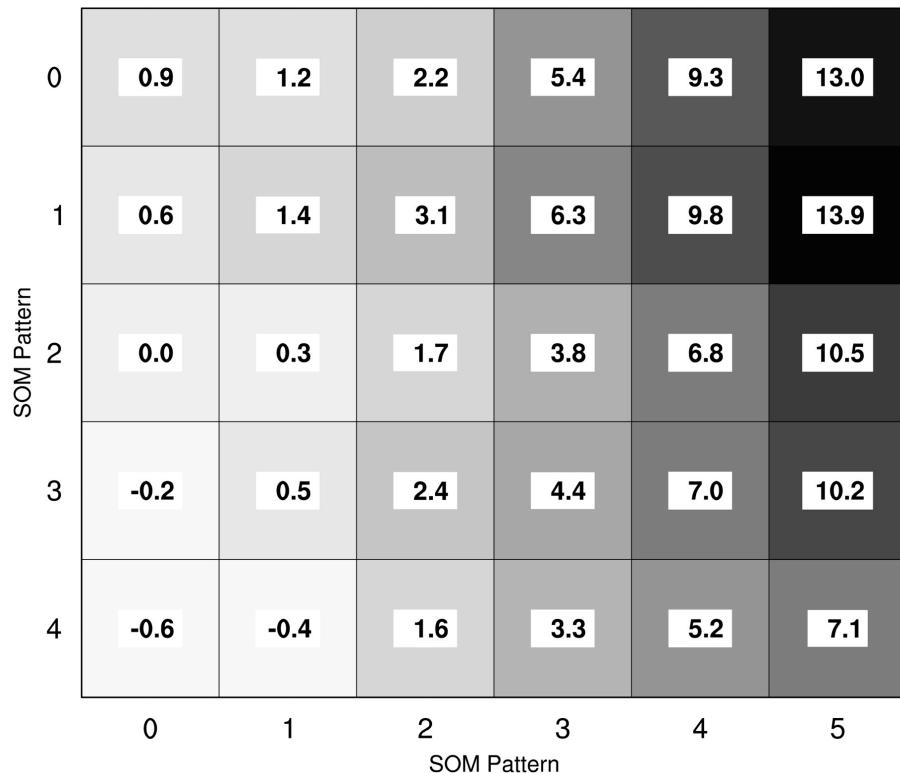


AWS Vertical Profile Wind Speed Average

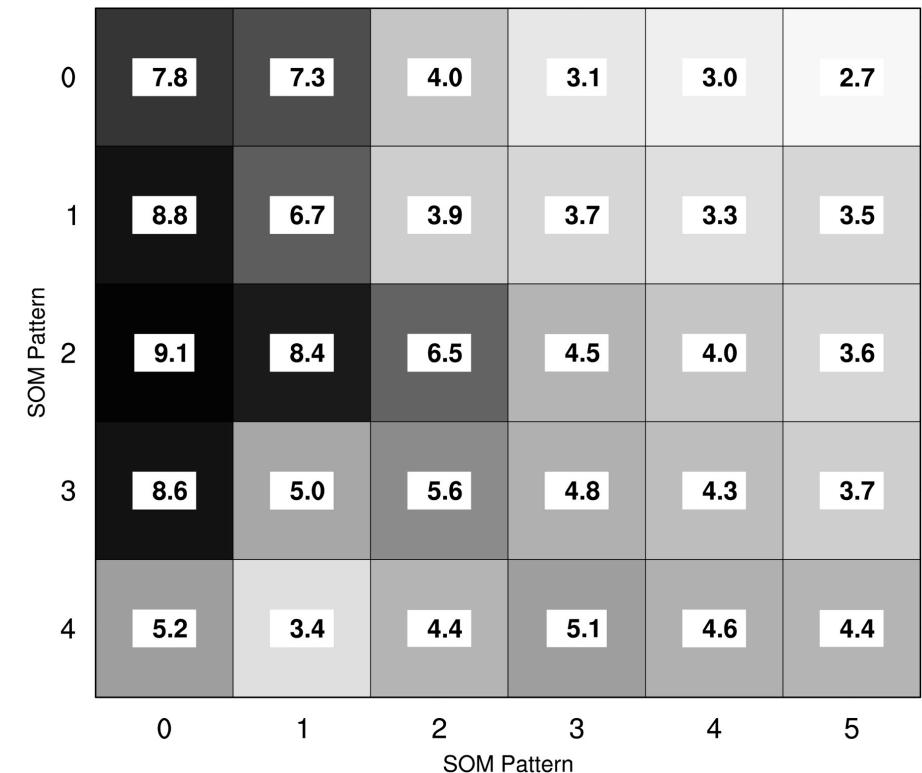


Temperature Difference & Wind Speed Average

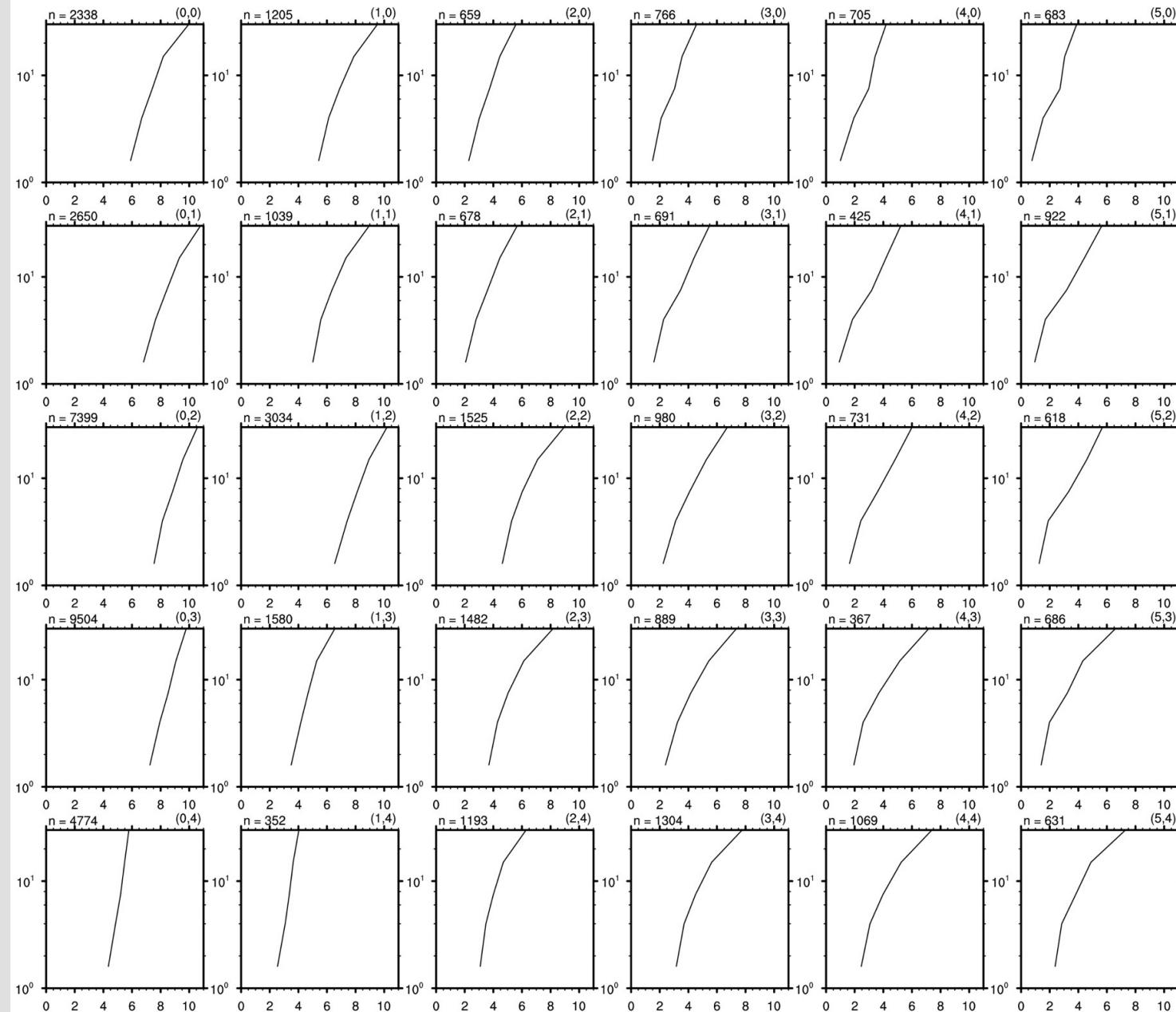
AWS Vertical Profile Temperature Differences



AWS Vertical Profile Wind Speed Average

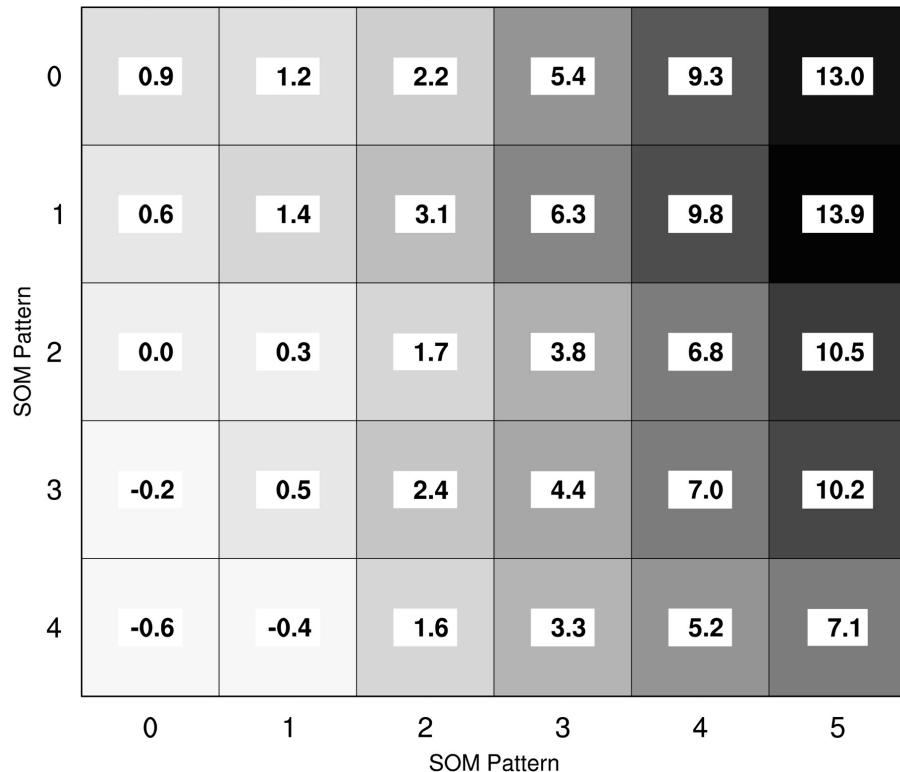


Wind Speed Average - Log Scale

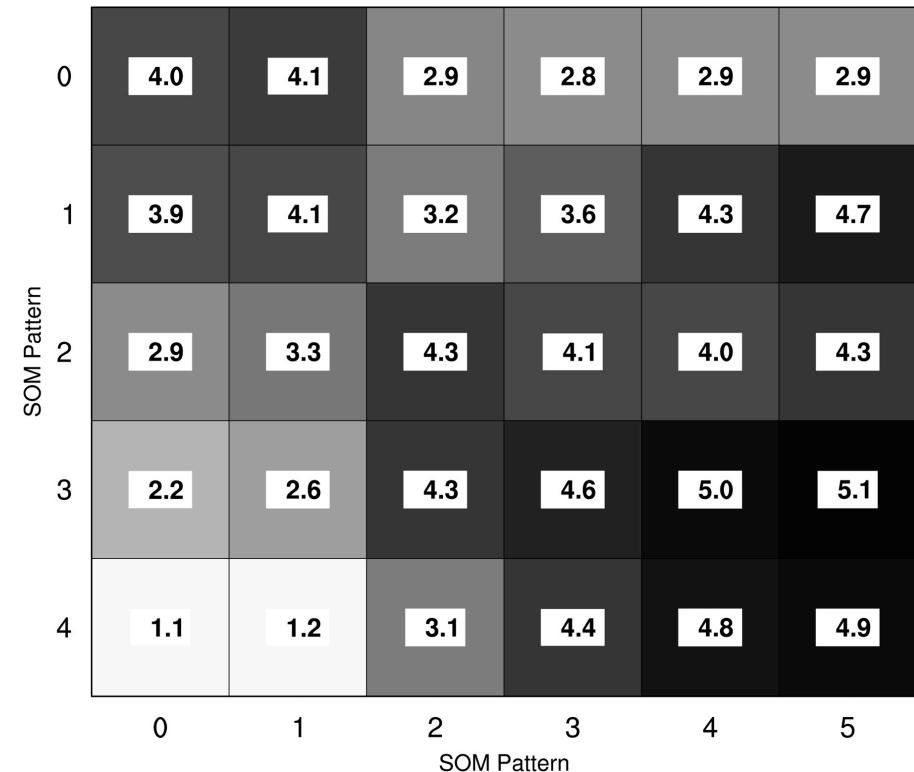


Temperature & Wind Speed Difference

AWS Vertical Profile Temperature Differences



AWS Vertical Profile Wind Speed Differences

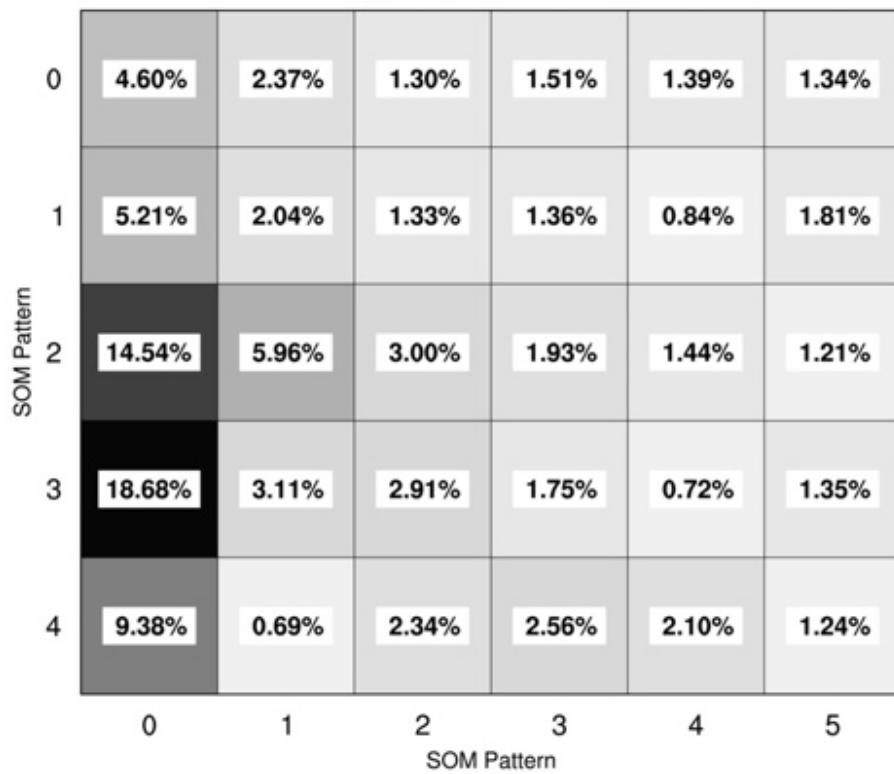


Next Steps

- * Incorporate the 2012 observations
- * Analyze derived variables – i.e. vertical profiles of potential temperature, Bulk Richardson #, etc.
- * Find a way to visualize the range of patterns that map to a given node
- * Use AMPS to relate the Tall Tower! observations to broadscale weather patterns
- * Relate future SUMO observations to Tall Tower! observations

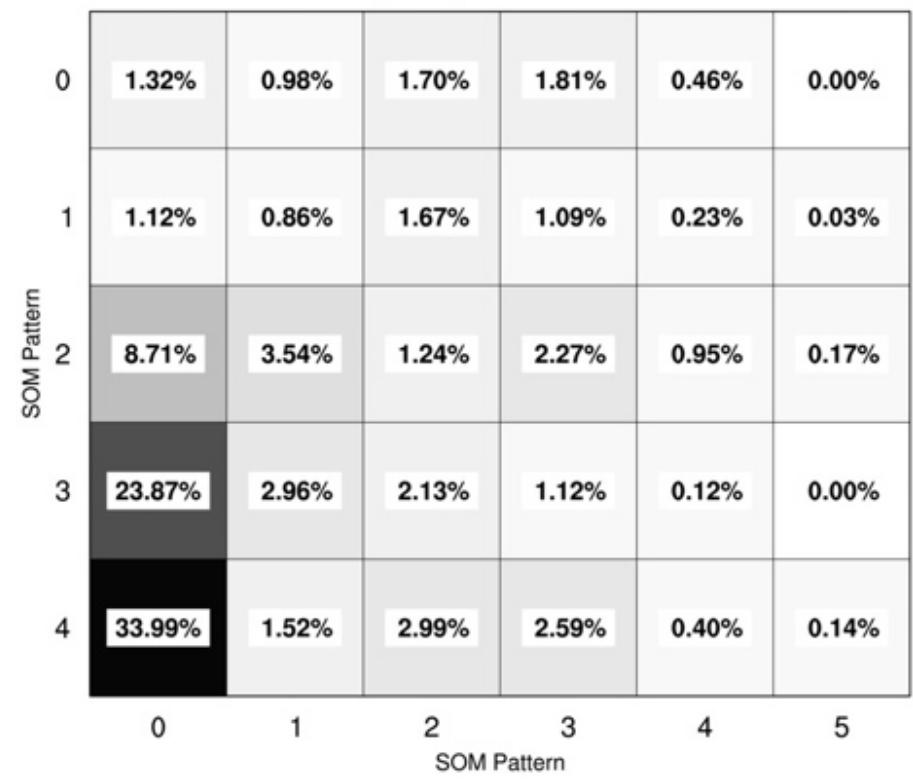
SUMO Flights - January

AWS SOM Pattern Frequency - ALL



52.41%	14.17%	10.88%	9.11%	6.49%	6.95%
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AWS SOM Pattern Frequency - J



69.01%	9.86%	9.73%	8.88%	2.16%	0.34%
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SUMO Flights - October





Questions/Comments/Suggestions?