

# South Dakota Wind Resource Assessment Network and the South Dakota State Climate Office

## Review and Where do we go?

Dr. Dennis Todey

Assoc. Prof. SDSU

South Dakota State Climatologist

ABE/AES/CES – President AASC

Dr. Mike Ropp EE SDSU

Chirag Shukla – Raven Industries

Joanne Anderson - SDSU

# WRAN Background

- Anemometers placed on existing towers (cell, SD Public Broadcasting)
- Initial stations 30-50 m. Gradually worked upward
- Highest heights today 90 m
- Two anemometers at each height (account for tower effect)

# WRAN Background

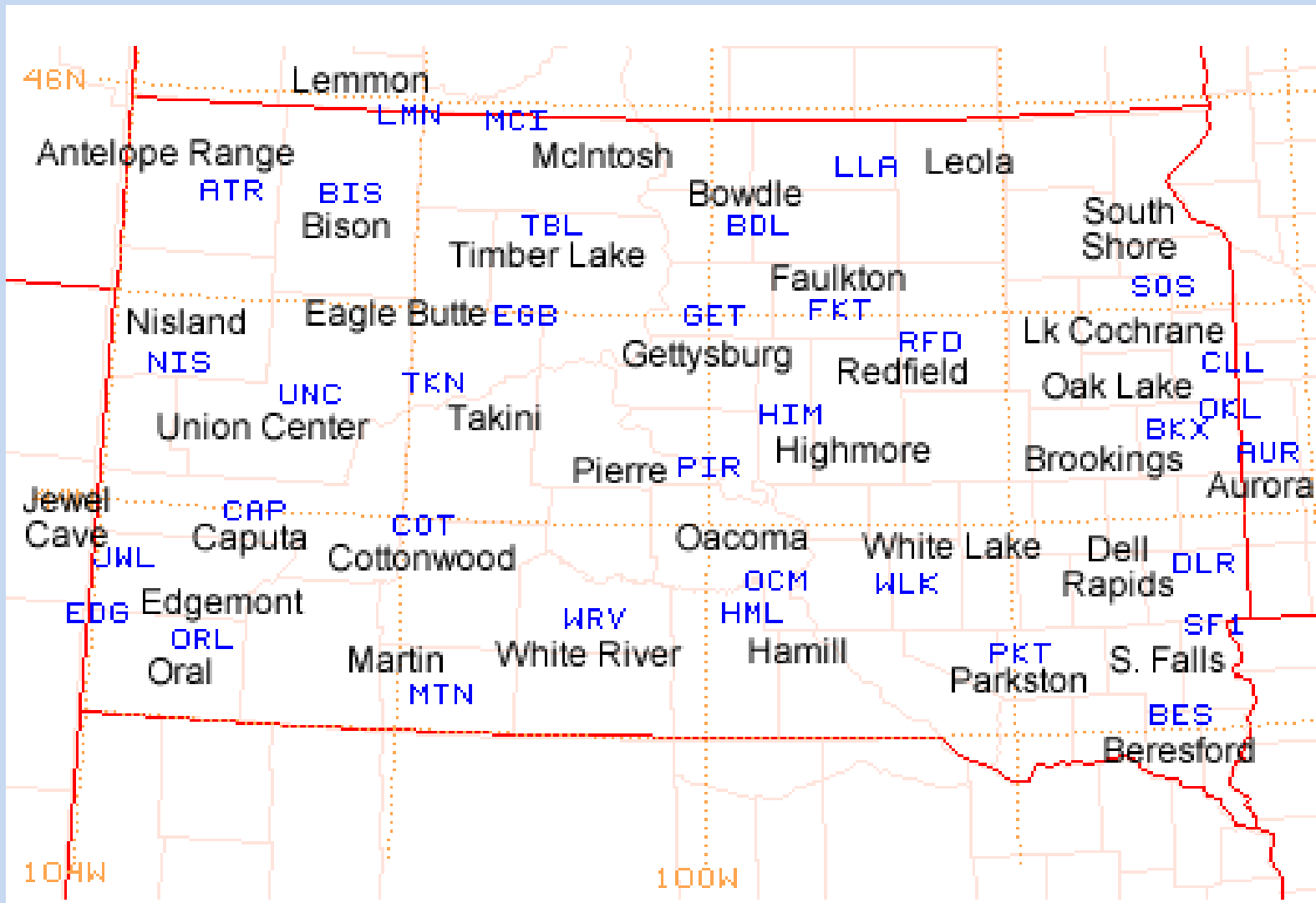
- Dr. Michael Ropp SDSU – EE originator
- Data extends back to 2002-03 for some locations
- Available on Internet
- <http://www.engineering.sdstate.edu/~wran/>

# SCO Work

- Manage 40 weather station network in the state – data maintenance
- Collect and disseminate data from various state networks  
(AWDN/ASOS/AWOS/RAWS/DOT)
- Create summaries from data for general use and historical perspective

# Sensors and weather stations





Click on a station

# Status

- Continuing data collections from existing platforms
- Determining data quality from existing data
- Web site changes
- Hiring for data management and communications work
- Updating data to databases

# Wind Resource Assessment Network



**Red** = Existing Sites

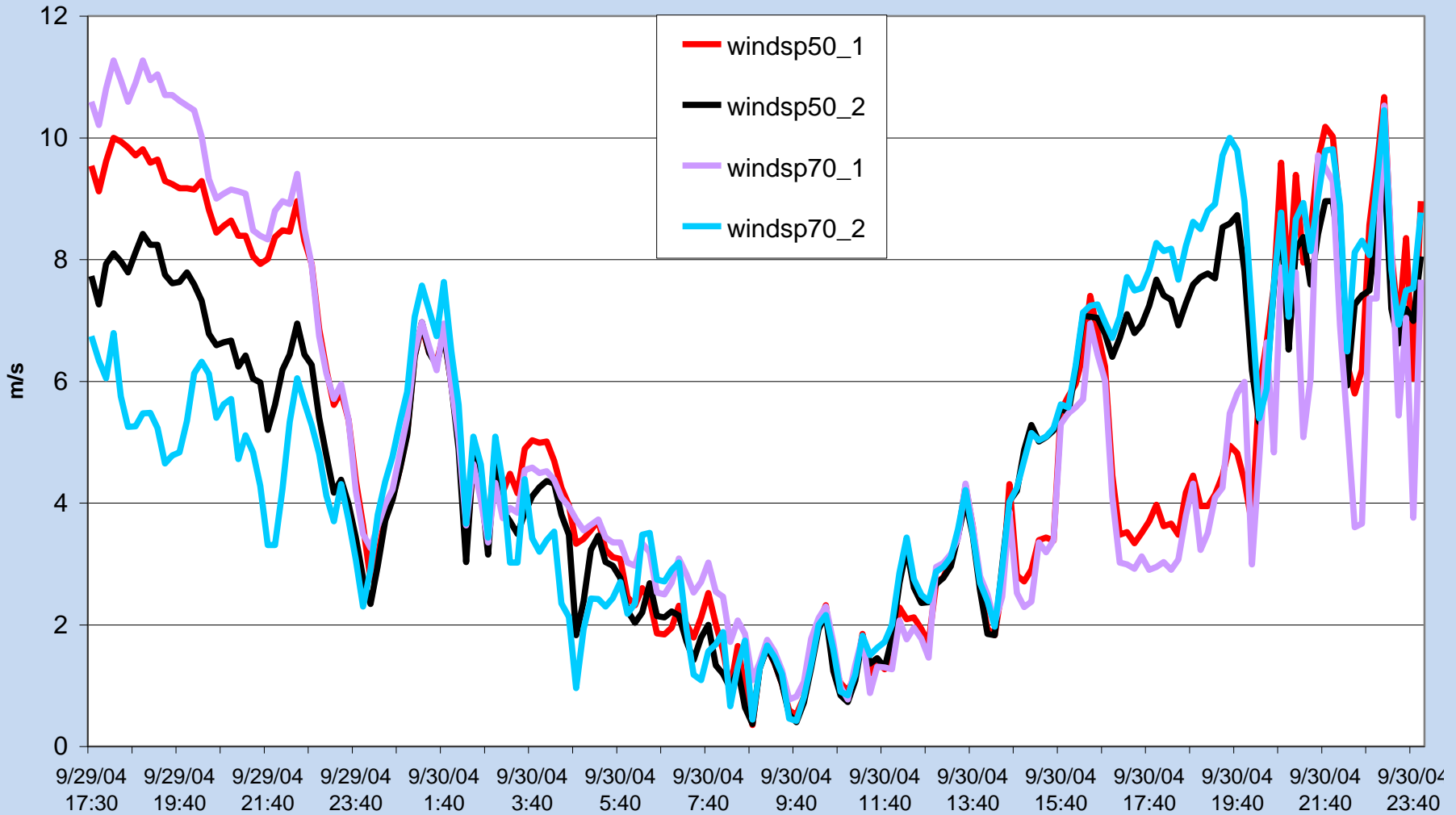
**Blue** = Proposed New Sites

Belle Fourche 9372	<b>45-0644/-103.6162</b> 40m(one) 50m (one) 60m Wdir 50m 60m
Gettysburg Very messy data	<b>45-4849 /- 99.9687</b> 50m 70m 90m Wdir 50 and 70
Medicine Butte 8473	<b>44-0079 /-99.6385</b> 10m 30m 50m Wdir- 30m 50m
Ginsbach 2	Unknown lat/long 10m 30m 50m Wdir 30m,50m
Oak Lake 2252	<b>44.5/-96.52</b> ?? 70m Wdir 50 70
Murdo 3177	<b>43.9375/-100.6792</b> 50m 70m 90m Wdir 50 70
Ft. Thomson 3172	<b>Unknown Lat and long</b> 50m 70m 90m Wdir 50 70
Crow Lake 3173	<b>Unknown lat and Long</b> 50m 70m 90m Wdir 50 70
Leola 3174	<b>Unknown lat and Long</b> 50m 70m 90m Wdir 50 70
Crandall 3175	<b>Unknown lat and Long</b> 50m 70m 90m Wdir 50 70
Summitt 3176	<b>Unknown lat and Long</b> 50m 70m 90m Wdir 50 70
Kindred 1	<b>Unknown lat and Long</b> 10m 30m 50m Wdir 30 50

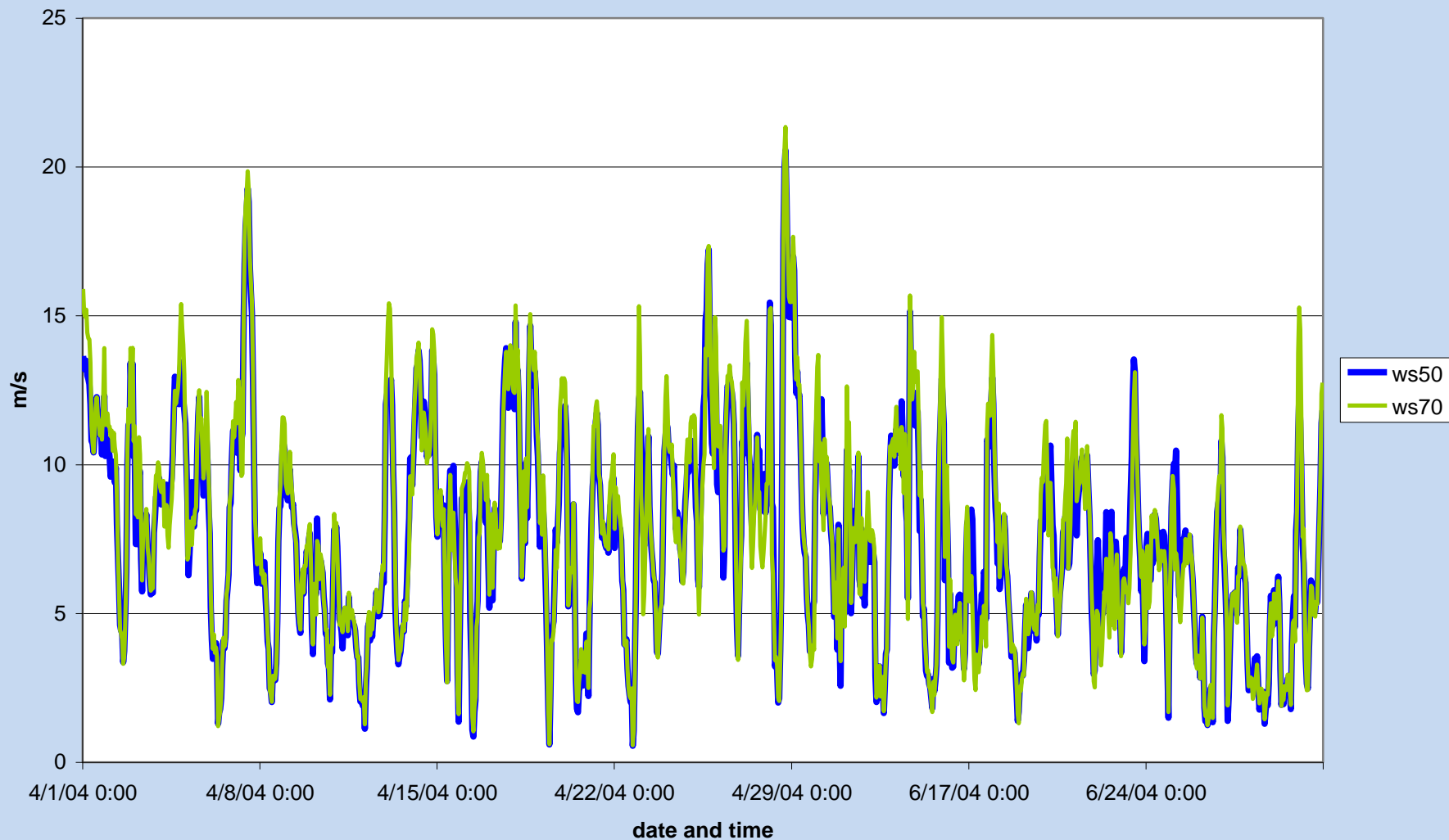
# Issues

- Differences in wind speed at same level (bad data or wind effect)?
- Variability of wind speed
- Variability across the state in wind speed/condition
- Poor quality control
- Differing data collection mechanisms

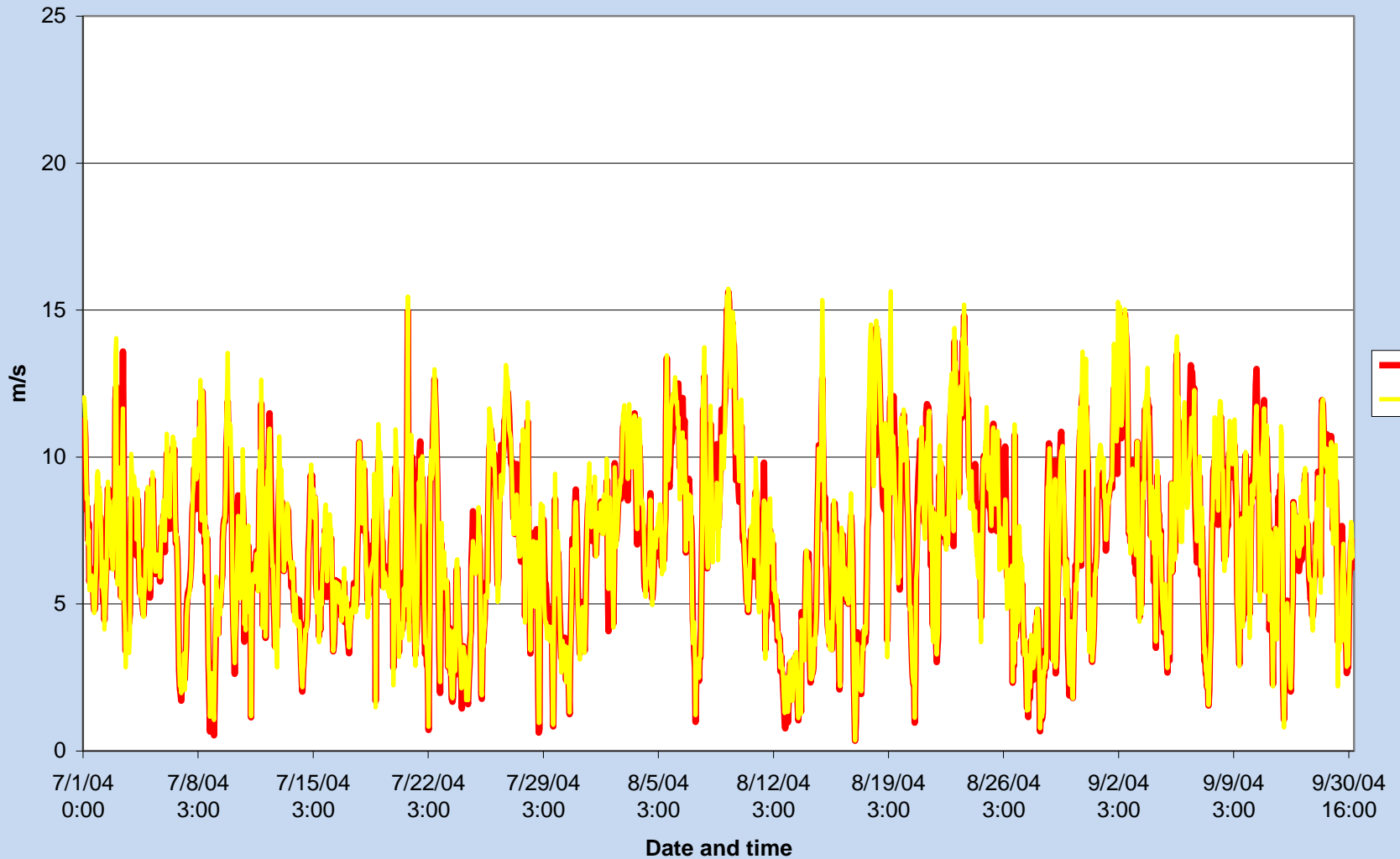
Sept 29 and 30, Fort Thompson 2004  
50 & 70 meter Height Wind Speeds sensor 1 & sensor 2



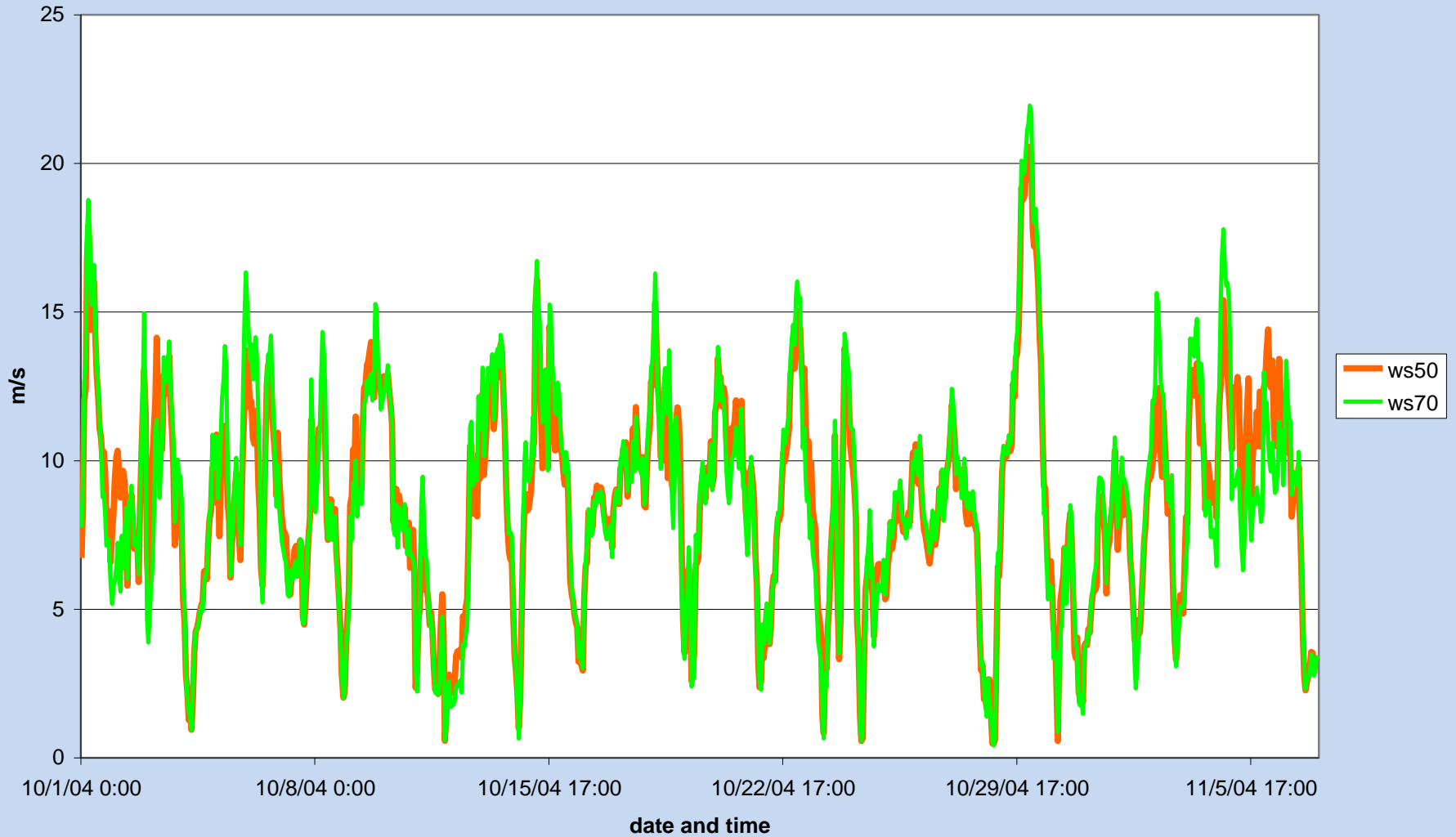
### Leola 2004 Hourly Average Windspeed at 50 and 70 meter heights for April, May and June 2004



# Leola Average Hourly Wind Speed at 50 and 70 meter heights for July, Aug, & Sept 2004



### Leola Average Hourly Wind Speed at 50 and 70 meter heights for Oct, Nov and Dec 2004



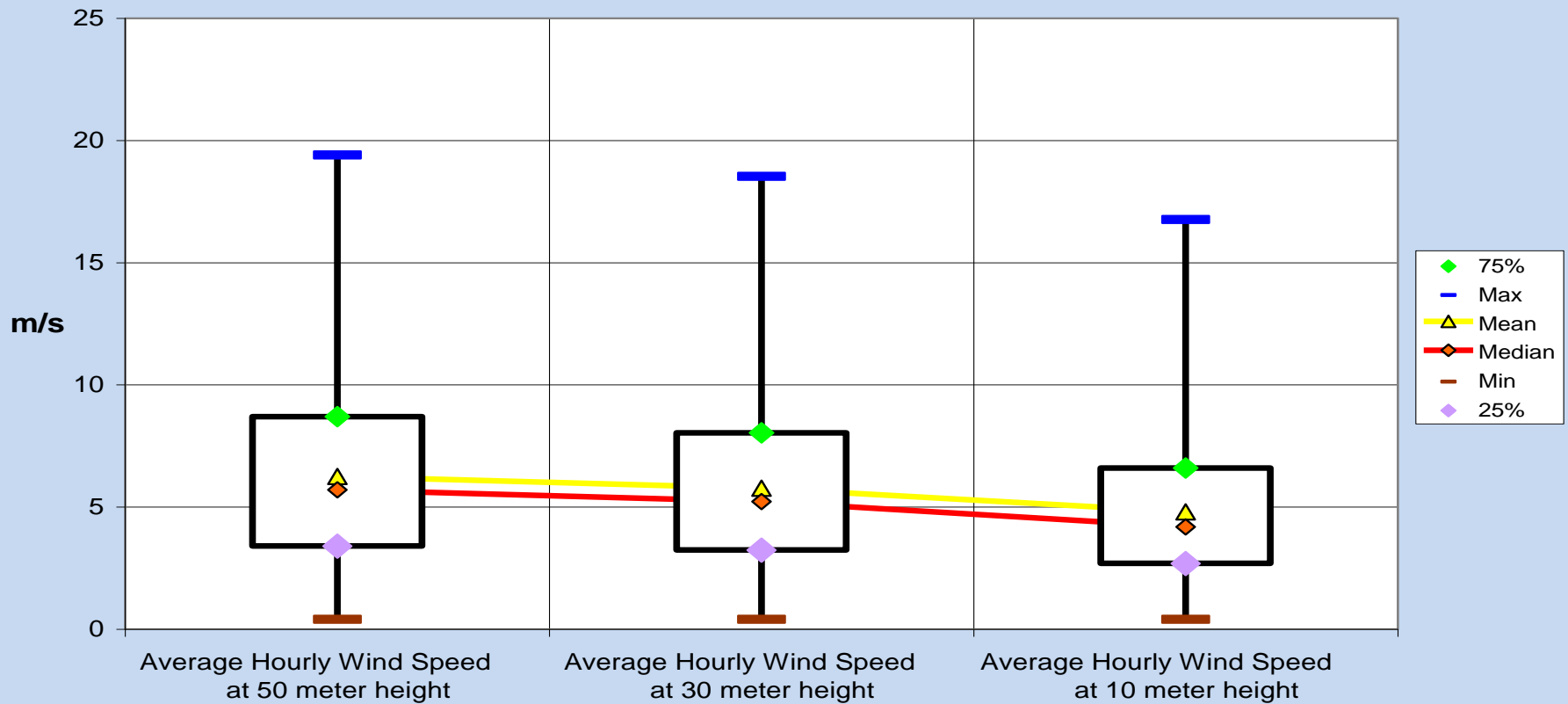
# Research task –scaling from other heights

# Using alternate height data

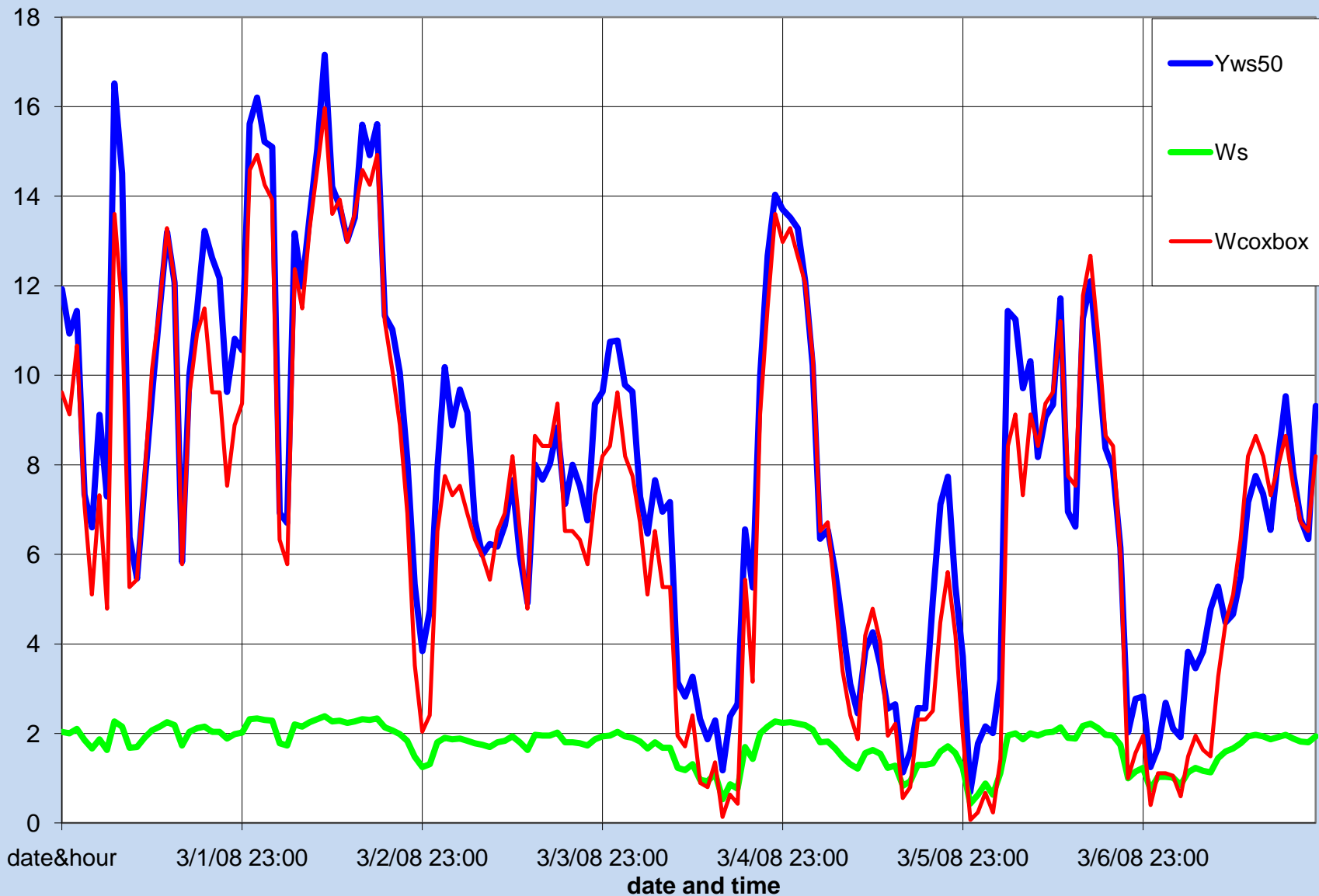
- Wind increases aloft – not regularly
- Difficult to place tall towers everywhere
- Can we scale from other data?
- 10 m or somewhat taller

# Excel Box Plots

Box Plots of the wind speeds  
at Kindred from September to the end 2008



### First week of march winds



# Interaction

- LIDAR Interests
- Calls about additional towers
- Data sharing from other towers

# In process

- Web site move (better control over site) to state climate office web site
- Continuing to download data and update to web site
- <http://climate.sdstate.edu/wran/>
- Staffing – lost main programmer – need to restaff to manage data and equipment
- Software for capacity factors being acquired

# Future funded work

- Funded to add new equipment (real-time) to 5 towers through DOE grant
- Change equipment and dataloggers to be real-time
- Feed data to NOAA and Windlogics for ingestion into models
- Focus is wind ramp issues

# Future work

- LIDAR/SODAR co-location with towers
- Additional instrumentation (temperature/humidity) – interest from meteorological community and additional wind information
- Would improve overall forecasts (weather)
- Also would feed to models for wind power forecasting
- Possible National Science Foundation MRI?

# Future work

- Additional sites for towers/revamping of wind equipment – quality and communications
- Cleaned up data applied to database
- Further work on relating wind speeds at different heights to scale wind from other existing observation platforms
- What are the needs to community?

# Thank you!

 **SunGrant**  
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South Dakota State University

