MESOWEST

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Examining Publicly-Available Tall-Tower Observations Alexander A. Jacques (alexander.jacques@utah.edu) and John D. Horel (john.horel@utah.edu) Department of Atmospheric Sciences, University of Utah

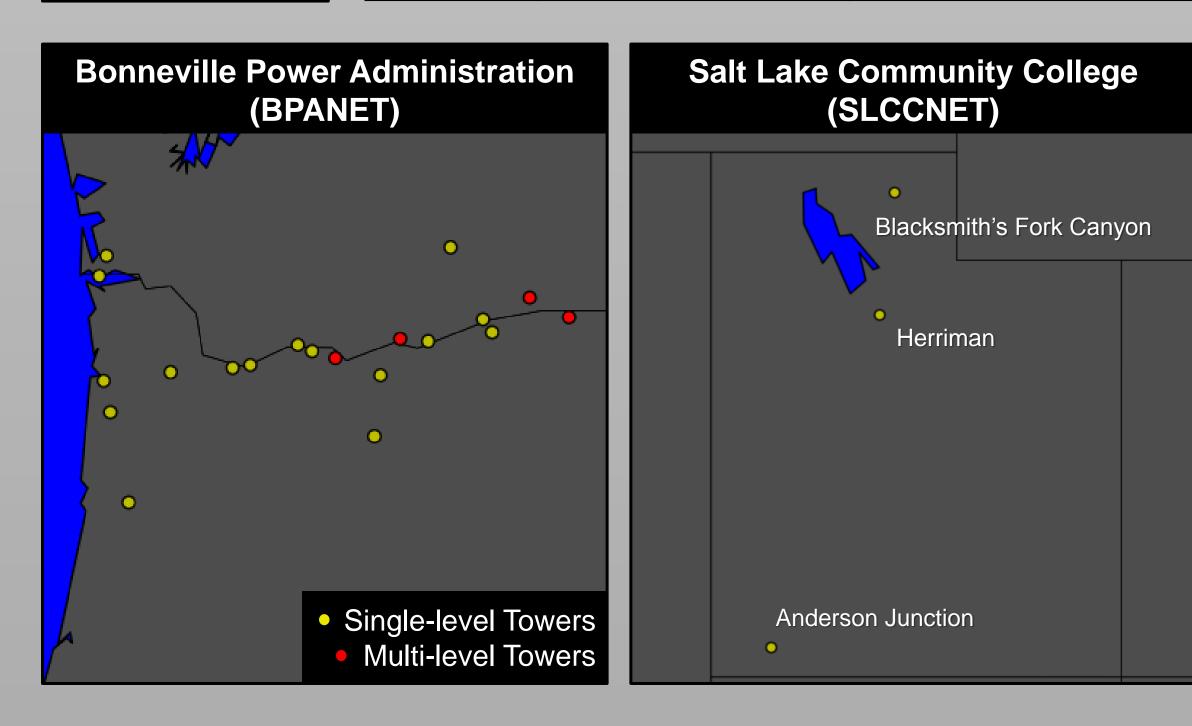
Primary Motivation

- MesoWest: collaborative project between the University of Utah, National Weather Service, and over 120 data providers
 - Goal: provide access and displays for current and archived surface weather observations across the United States
 - Data for 34,000+ unique stations (21,800+ in real-time) • Aggregation and dissemination source for:
 - Meteorological Automated Data Ingest System (MADIS)
 - National Center for Environmental Prediction (NCEP)
- Requests received to acquire and archive observations from data providers with multiple wind sensors on tall towers

Present Tall-Tower Providers

- Utah Office of Energy Development's Anemometer Loan Program now managed by Salt Lake Community College
- In partnership with MesoWest, real-time cell phone access to multiple wind sensors on up to fifteen 20-60 m tall-towers is being implemented by Fall 2012 (SLCCNET network)
- Bonneville Power Administration (BPANET): network of tall towers primarily located along the Columbia River Gorge
- Oak Ridge National Laboratory (ORNL): network of 11 tall towers located on ORNL property in Tennessee

	Network	BPANET	SLCCNET
	Stations	20	3 (+12)
	States	OR/WA	UT
2012/01/10 10:54	Data	Jan 2012 – pres.	June 2012 – pres.

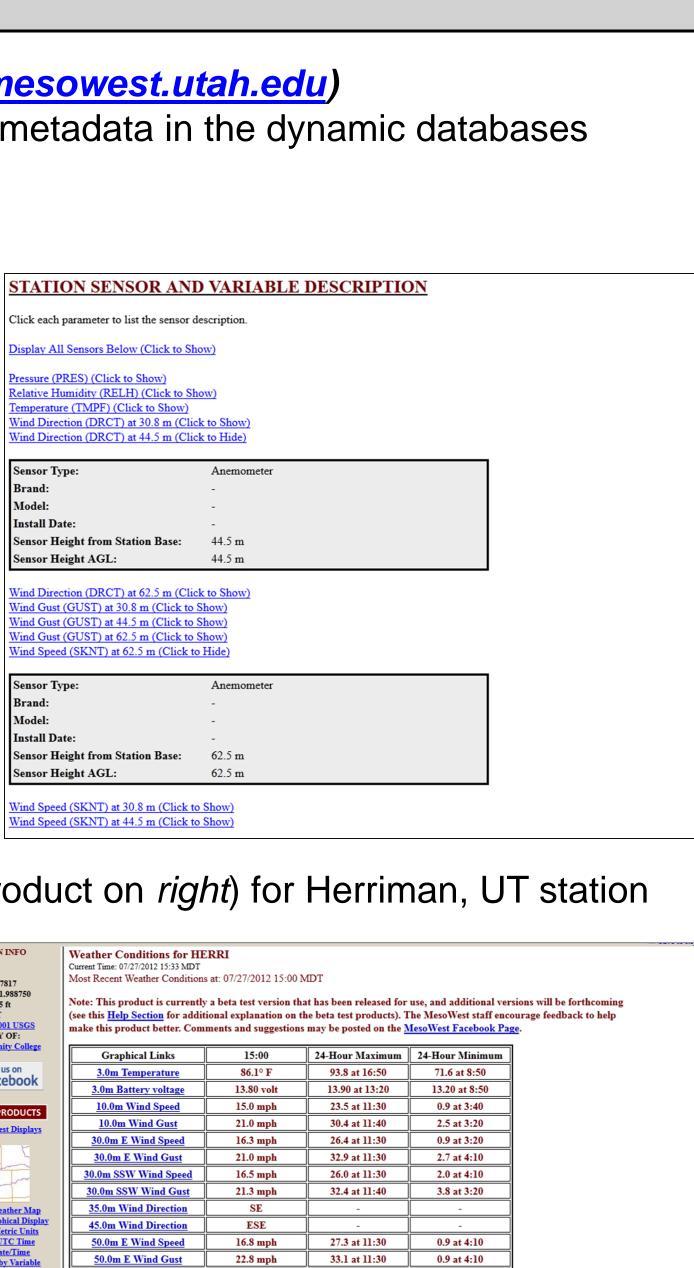


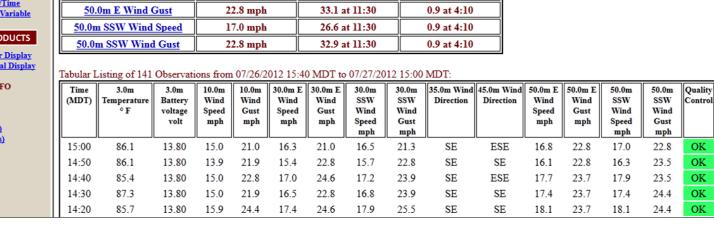
Wind Energy Application

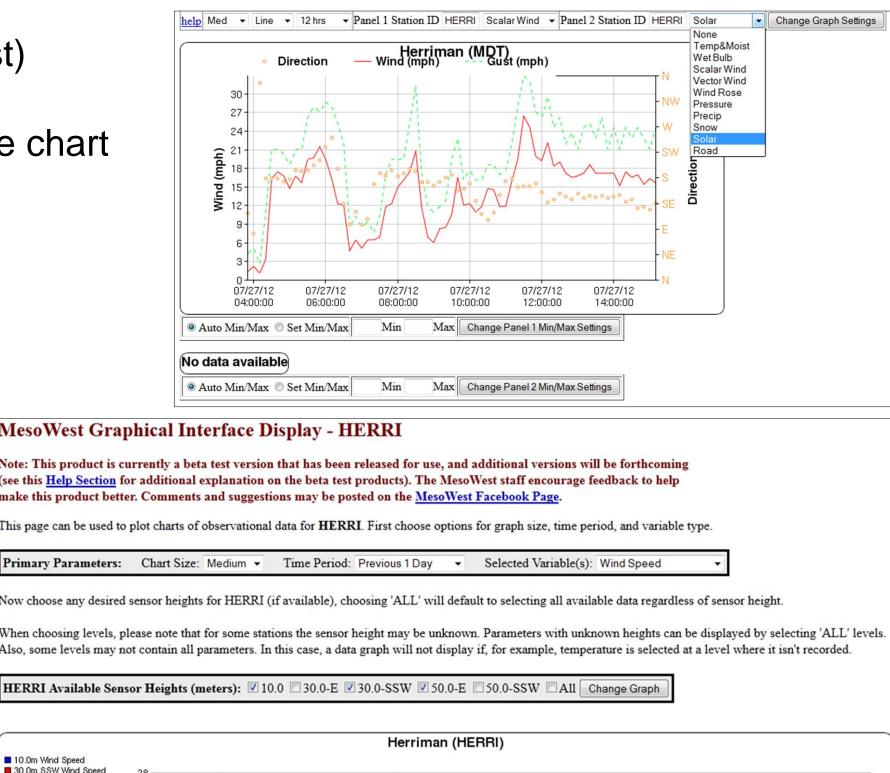
- Tall towers: important data source for nowcasting conditions of the planetary boundary layer for wind energy and public safety
- Critical wind energy concern: nowcasting wind ramp events (Freedman et al. 2008; Kamath 2009; Greaves et al. 2009; Marquis et al. 2011)
- Wind ramp: an event that produces >50% change in turbine power capacity over a period \leq 4 hours
- Ramp-up and ramp-down events refer to power capacity increases and decreases, respectively
- Estimating events from wind observations (Deppe et al 2012)
 - Ramp event: ±3 m s⁻¹ change in wind speed when either:
 - Wind speed within 6-12 m s⁻¹ (critical power ramp region) • Wind speed causes turbine shutdown (> ~ 25 m s⁻¹)

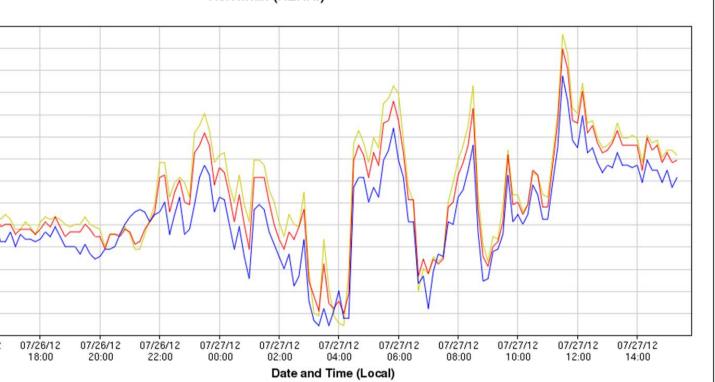
Storing and Visualizing Tall-Tower Observations I. Internal Data Storage in MesoWest Primary MesoWest database structure assumes each station only has one of each variable (*e.g.* one wind sensor reporting speed, direction, and gust) This structure breaks down when ingesting similar data from multiple sensors (*e.g.* RWIS road data as well as multiple wind sensors on tall towers) Station sensor metadata table now utilized to dynamically associate sensor height, orientation, and type to observations stored in new data tables Real-time access to tall towers established and data now flowing into new dynamic databases routinely II. Data Display Products on MesoWest Web Interface (<u>http://mesowest.utah.edu</u>) New web display products developed to access tall-tower data/metadata in the dynamic databases 1) Station Metadata Page LMS Station Metadata and Information Page view another station, input the Station ID and Click "Go": LMS ick to View LMS Metadata in Downloadable Text Format Simplified format PRIMARY INFORMATION More images Station ID: LMS Menu display Station Name: Locomotive Spring options Mesonet ID: Extended sensor metadata (if it is Image courtesy of Google Map. available for the LMS Current Observations (if available station) led Location Information (Click to Show) tional Station Information (Click to Show) Text file option U of U Mountain Meteorology Gr National Weather Service 2) Station Tabular Display (active product on *left*, new beta-test product on *right*) for Herriman, UT station Displays observations NAME: Herriman TITUDE: 40.4878 LONGITUDE: -111.98875 LEVATION: 4775 ft MNET: SLCCNET LAND COVER: <u>2001 USG</u> DATA COURTESY OF: NET: SLCCNET from multiple sensors LAND COVER: 2001 U TA COURTESY OF: Extended metadata Find us on Faceboo Find us on Facebook re Wind Wind Wind Quality Batt Observation count for BETA TEST PRODUC About Beta Test Displa 24-hour period Can order table by variable type or by Change to UTC Ti Change Date/Tim Order Table by Vari sensor height IGINAL PRODU Retained options to 2:30 83.3 19 26 SSE OK 13.90 MORE INFO change units, time period, and time-zone 3) Station Graphical Display (active product on *top-right*, new beta-test products *below*) Parameters pertinent to each station (not a default list) Dynamically changing list of sensor heights Ability to plot one or multiple levels of data on a single chart Larger graph sizes Better legend location Expected in future version releases: • Plot and compare two graphs at once Set range minimum/maximum values MesoWest Graphical Interface Display - HERR Note: This product is currently a beta test version that has been released for use, and additional versions will be forthcoming (see this Help Section for additional explanation on the beta test products). The MesoWest staff encourage feedback to help e that for some stations the sensor height may be unknown. Parameters with unkn Wind Gust ed by selecting 'AL Also, some levels may not contain all parameters. In this case, a data graph will not display if, for example, temper where it isn't recorded. HERRI Available Sensor Heights (meters): 2.0 All Change Graph 3.0m Temperatur 30.0m SSW Wind S 50.0m E Wind Speed Mr-m

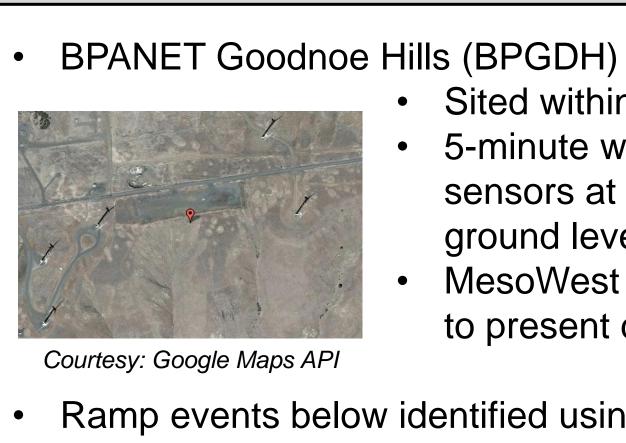
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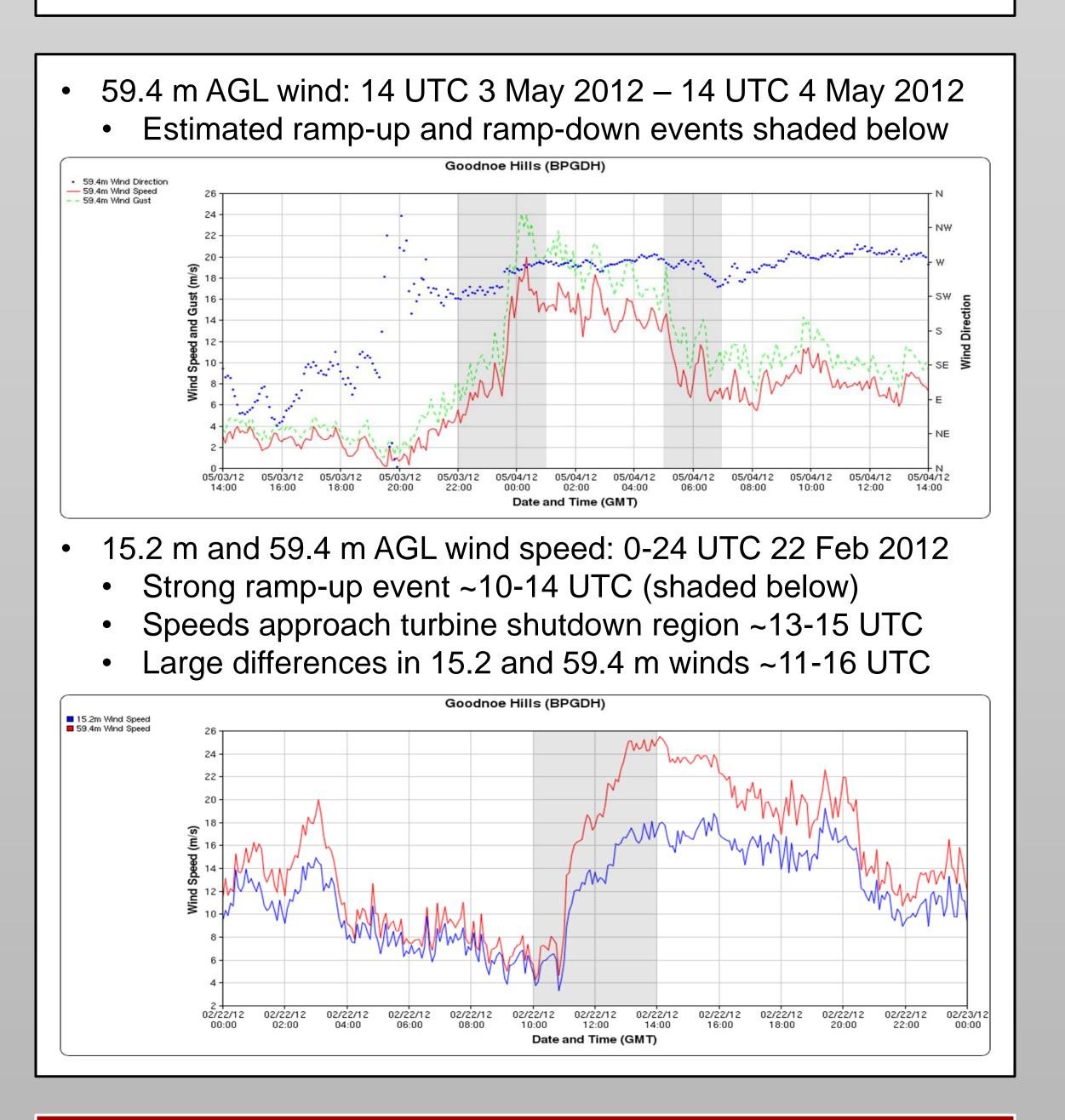












Summary and Future Work

- completed in Fall 2012

Acknowledgements

We would like to thank Brandon Malman (SLCC) for his work as the Anemometer Loan Program Manager and for installing communications to the UT tall towers. Funding for MesoWest provided by NWS support and the National Mesonet Program Expansion and Alignment (NMPX/NMPA) projects. We would also like to thank MesoWest staff members, Chris Galli and Judy Pechmann, who aided in design of the new dynamic databases.

To download a copy of this poster, please feel free to scan the following code provided here:



Wind Ramp Event Examples

- Sited within wind farm area
- 5-minute wind observations from two sensors at 15.2 and 59.4 m above ground level (AGL)
- MesoWest archive: late January 2012 to present day with minimal data gaps

Ramp events below identified using Deppe et al. (2012) criteria

Currently ingesting real-time tall-tower data from 3 networks Project with SLCC for accessing additional UT tall towers to be

Web-based data download products and real-time

dissemination of all tower data to MADIS in development Refine products with additional features and user feedback via email or Facebook (http://www.facebook.com/mesowest)

