

Field Element Data Quality Control from the Perspective of Data Redistribution

Doug Galarus

Western Transportation Institute
Montana State University

and others including:

Dan Richter

Western Transportation Institute
Montana State University

Sean Campbell

Division of Research, Innovation and Systems Information
Caltrans

Ian Turnbull

District 2
Caltrans

Western States Forum 2013

Thursday, June 20, 2013

Disclaimer

The opinions, findings and conclusions expressed in this presentation are those of the authors and not necessarily those of the Western States Rural Transportation Consortium, the California Department of Transportation, or Montana State University.

Acknowledgements

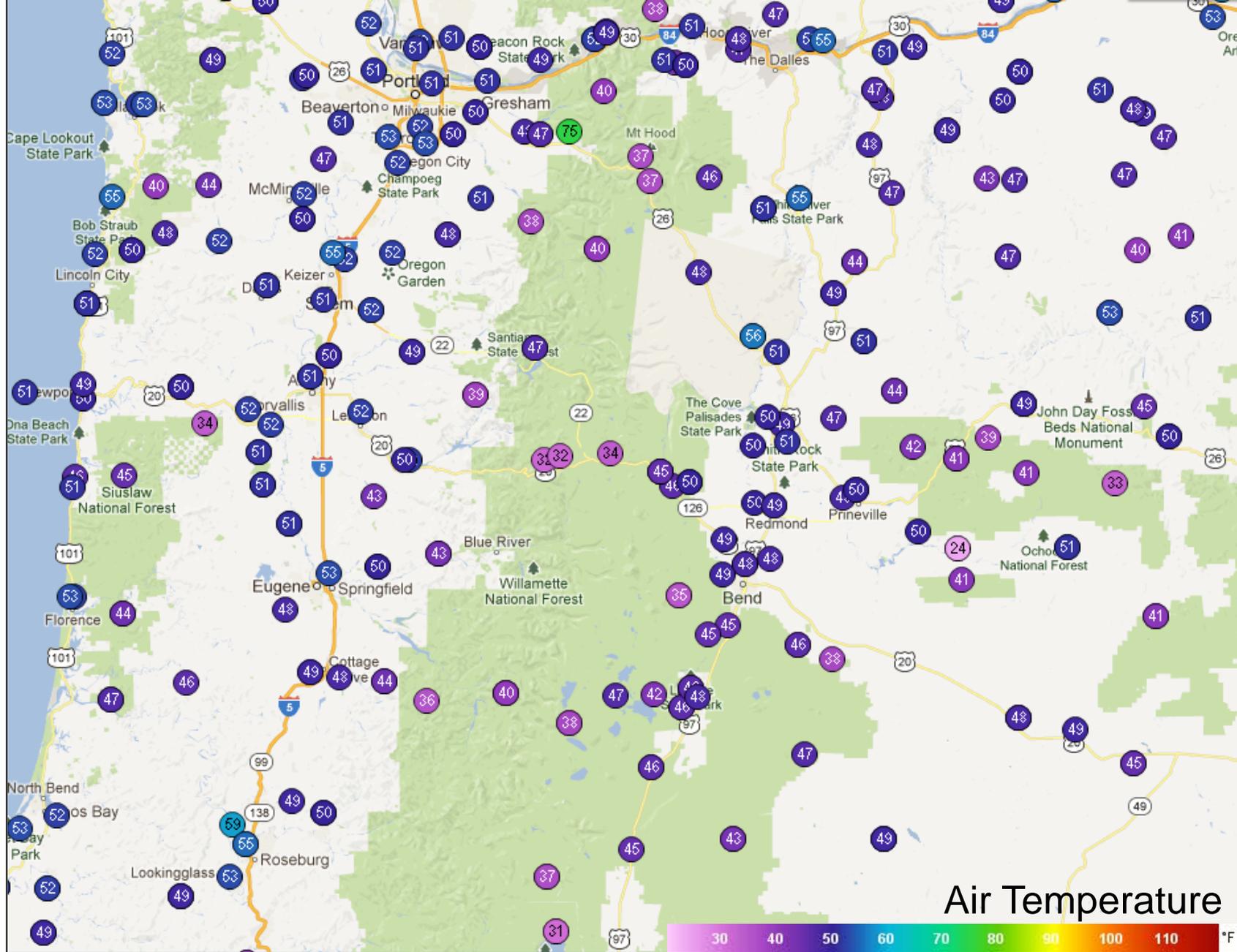
- *Caltrans D2*
- *Caltrans DRI*
- *WSRTC*
- *FHWA – Clarus*
- *WTI UTC*

Abstract

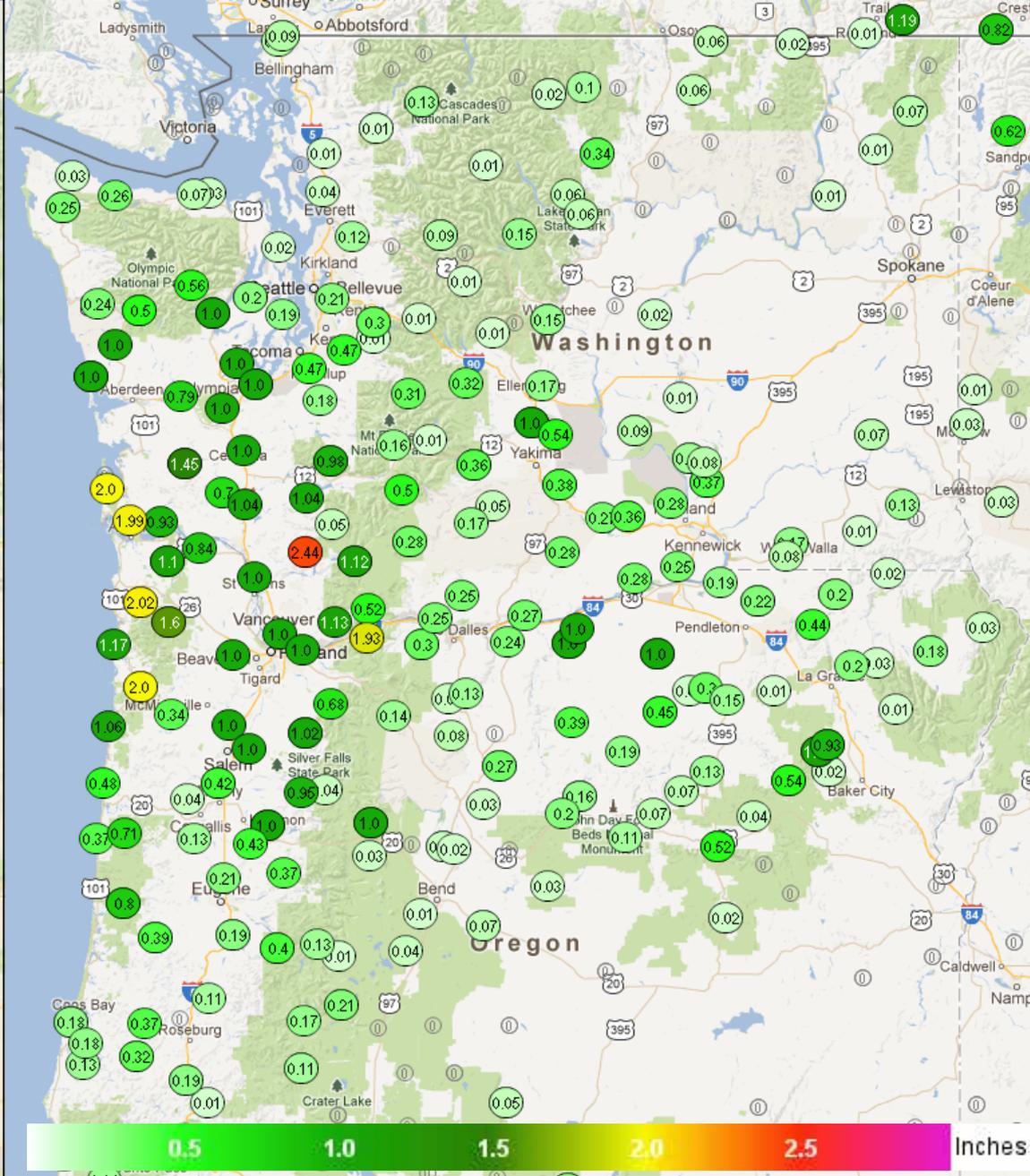
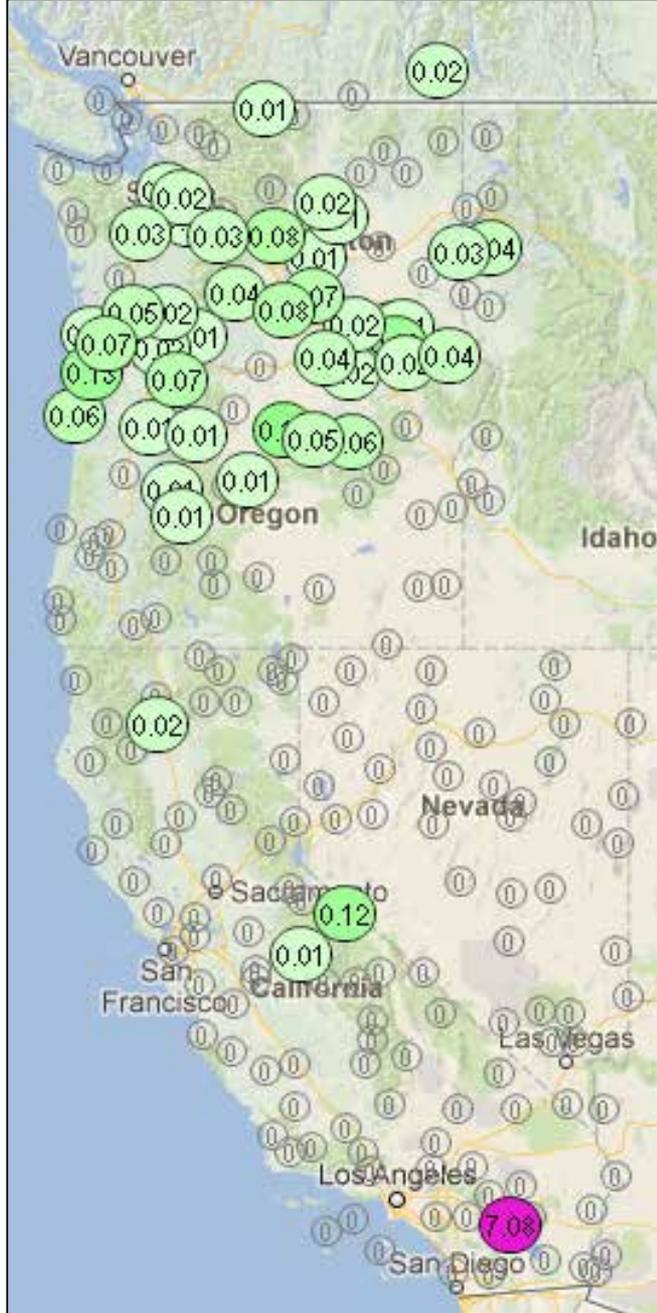
The Western Transportation Institute, in partnership with Caltrans and other members of the Western States Rural Transportation Consortium, have conducted a number of research and development projects over the past 10 years in which DOT field element data and other third party data has been aggregated and redistributed for the provision of traveler information and support of maintenance and operations activities. A challenge in all of these efforts has been the assessment and control of quality of the data presented. Common problems are incorrect metadata, including incorrect station locations, and the inclusion of erroneous data from sensors. In this presentation, we will discuss our quality control efforts experience to date on these projects, as well as the methods used by other data providers for quality control. We will also demonstrate the potential for further automation of quality control processes through the use of archived, multi-provider data.

Quality Control

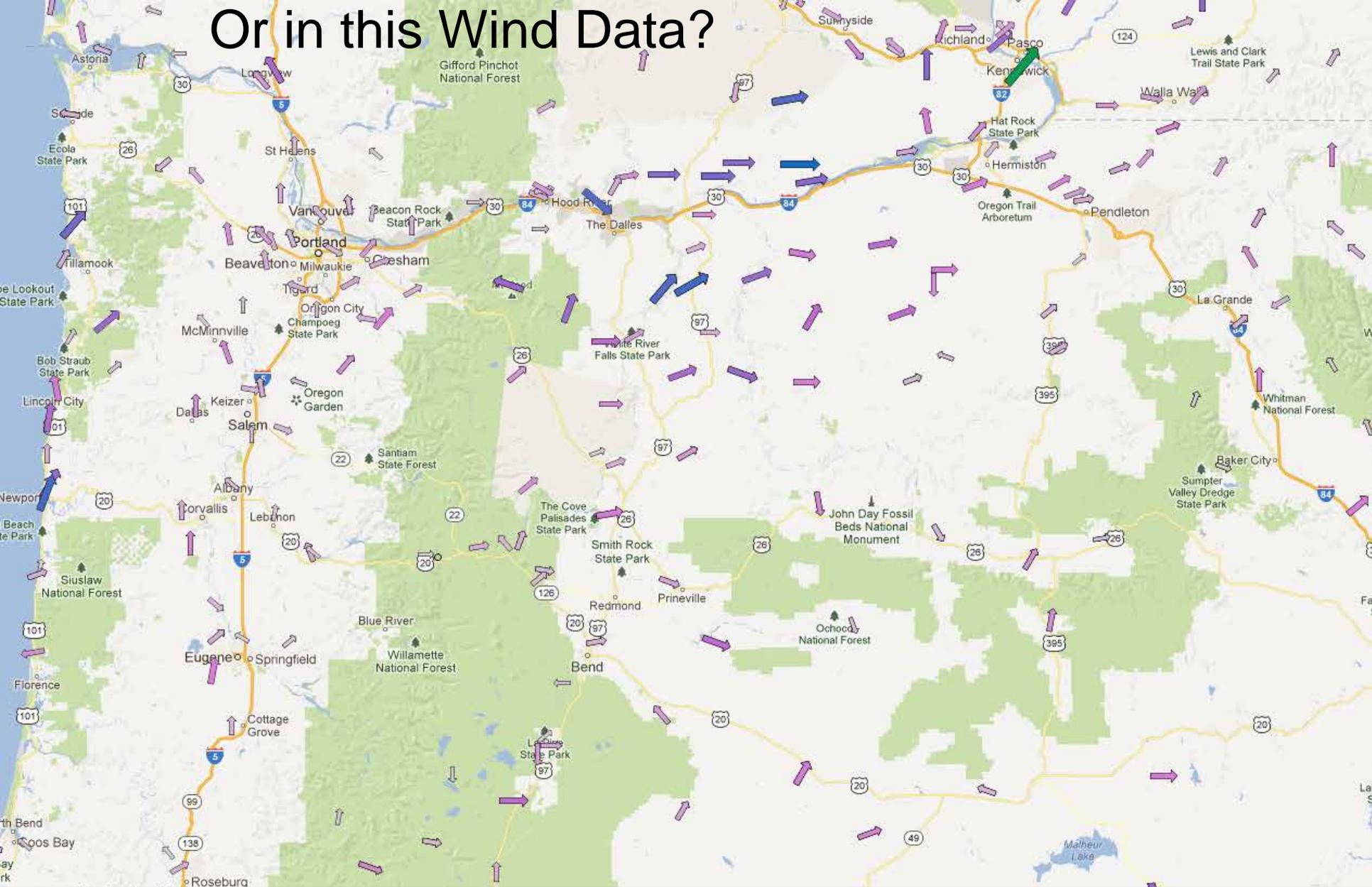
Is there any erroneous data here?



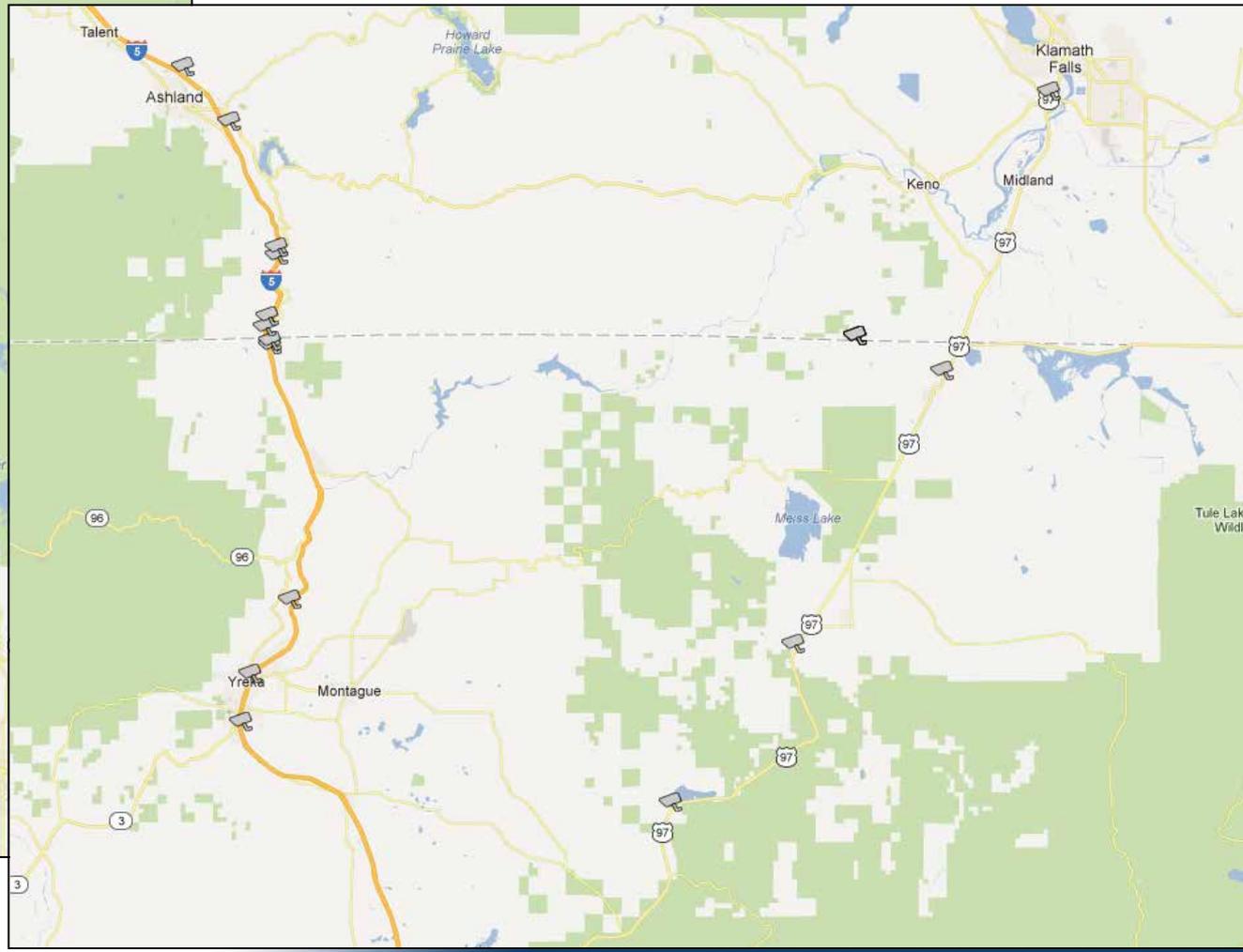
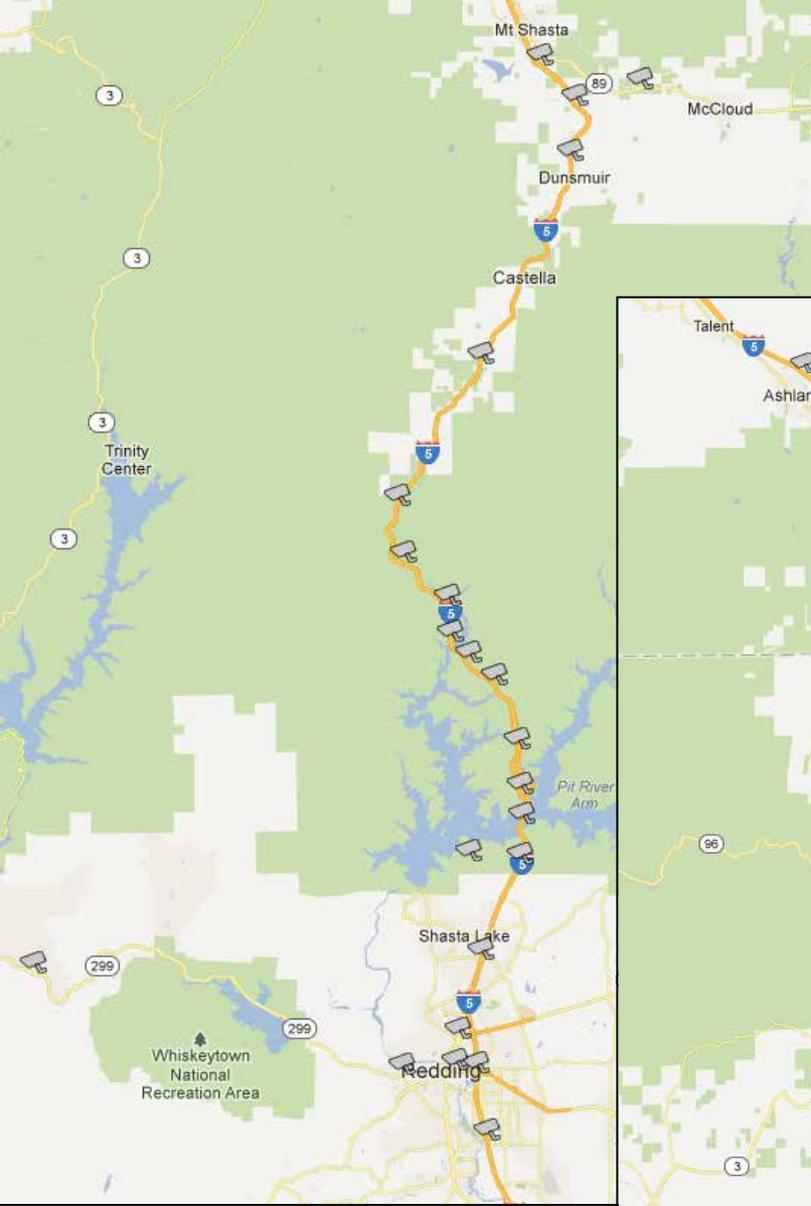
Or in this Precipitation Data?



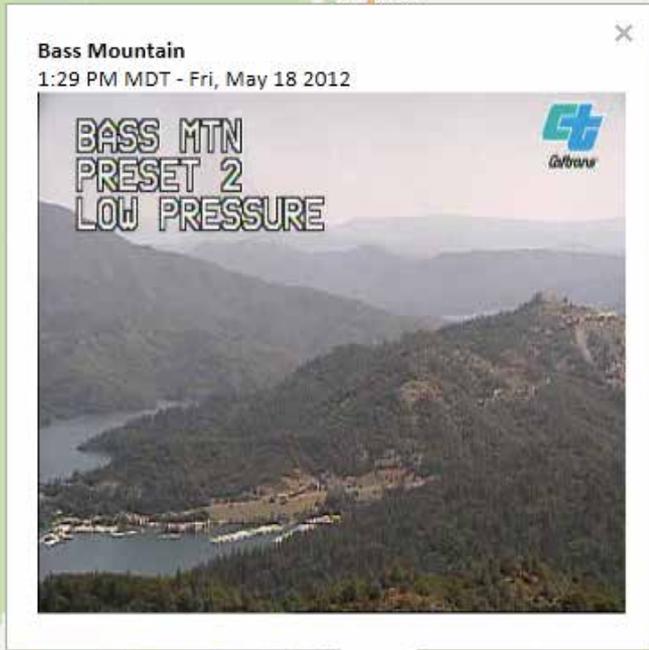
Or in this Wind Data?



Or with these
CCTV sites?



Or with these
CCTV sites?



Can you tell now?

BASS MTN
LOW PRESSURE



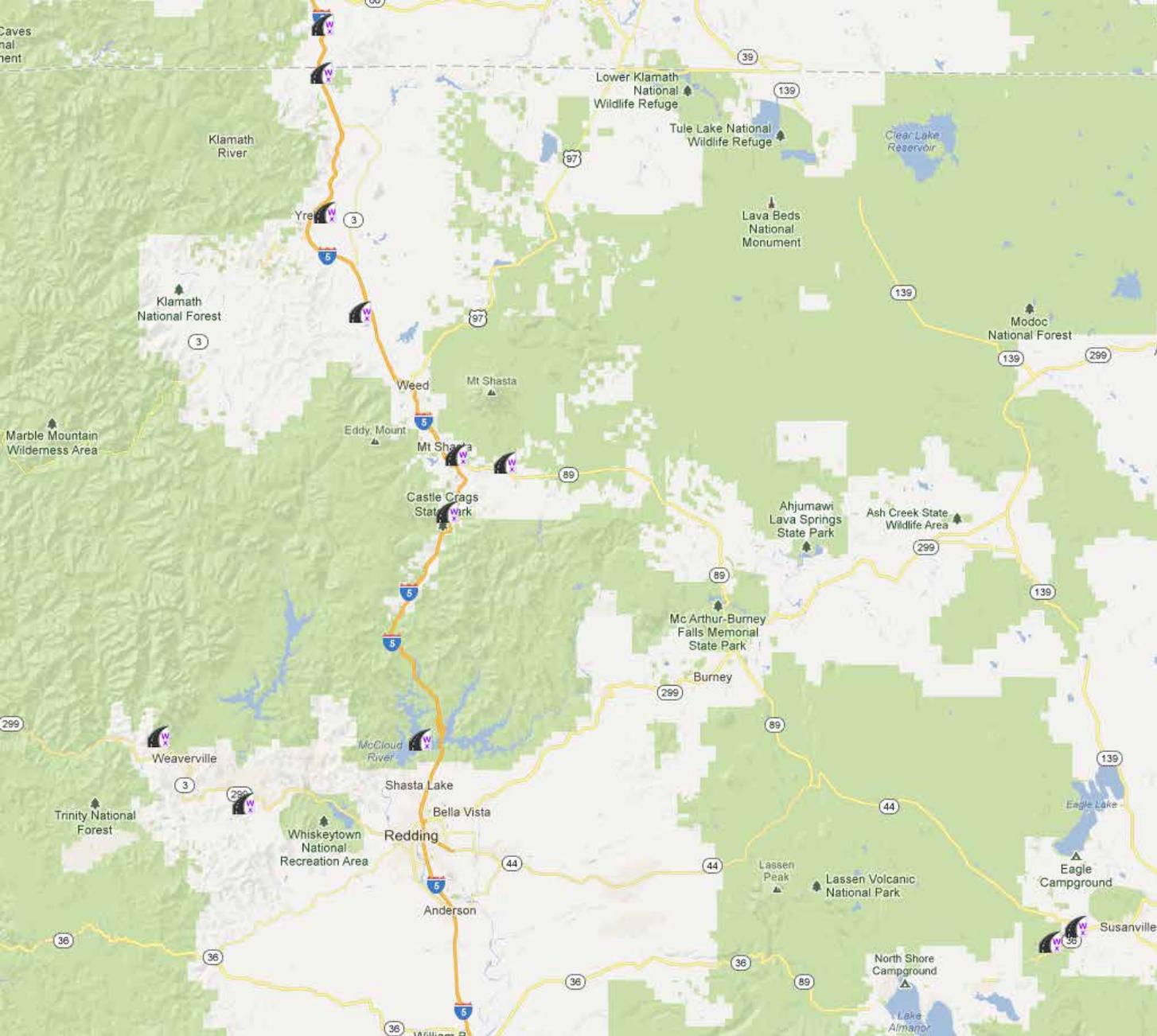
BASS MTN
LOW PRESSURE



BASS MTN
LOW PRESSURE

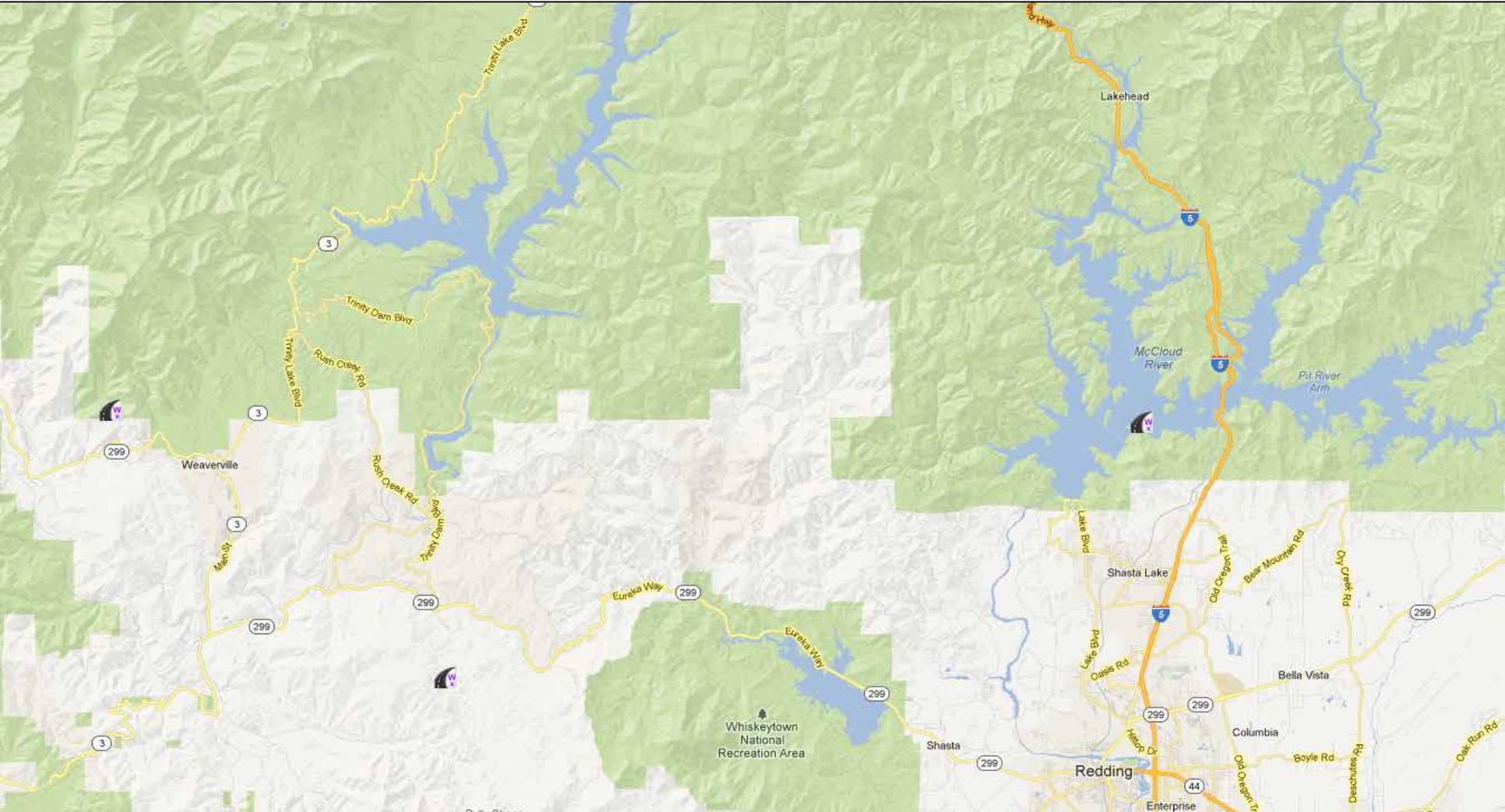


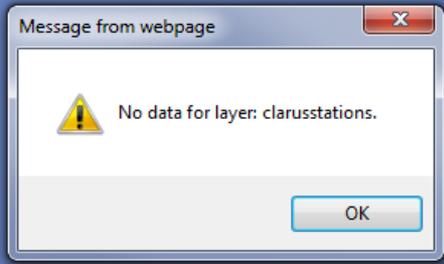
Is this a problem?



Do you see any problems with these RWIS sites?

Can you tell now?

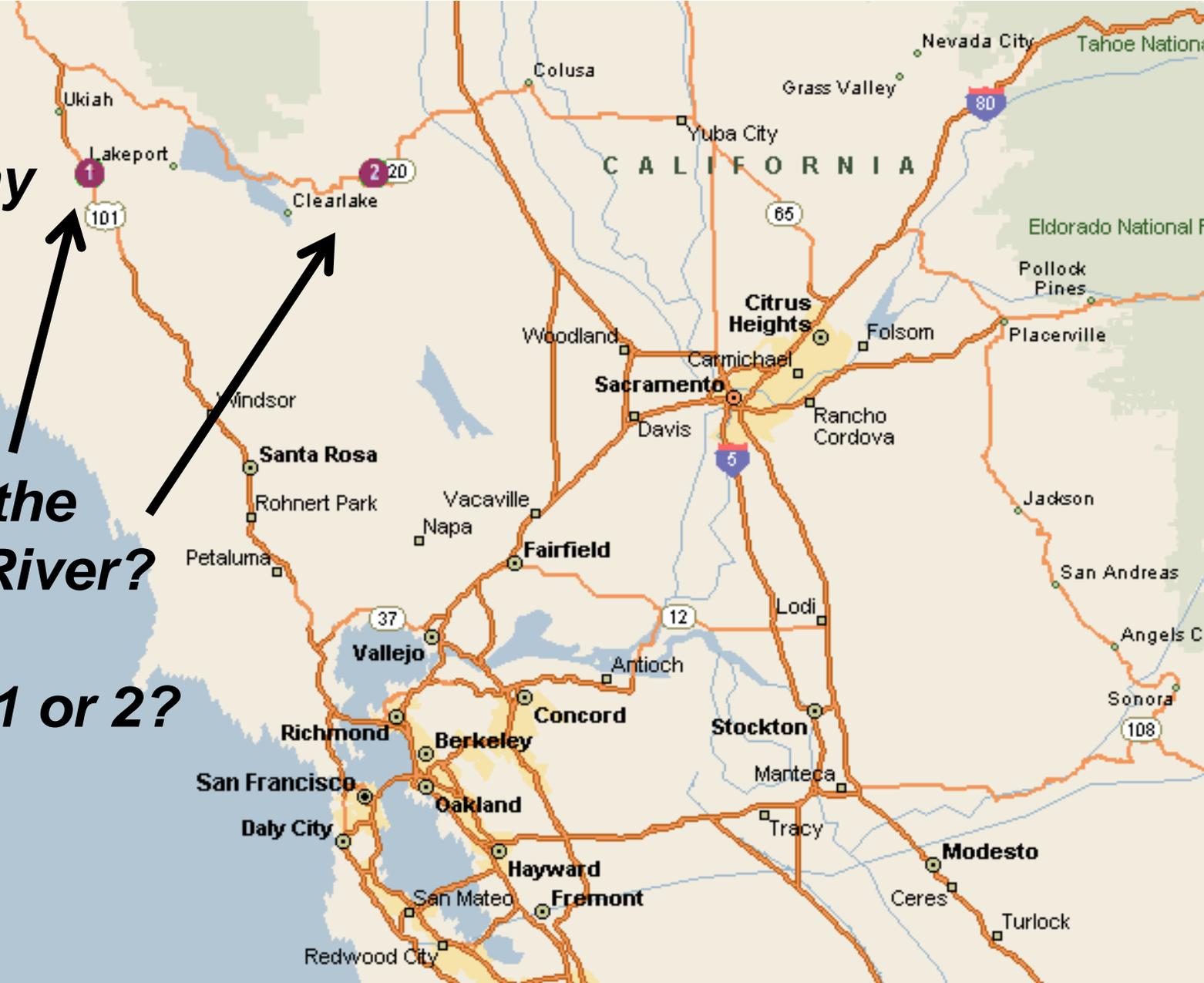




Geography Quiz:

Where is the Russian River?

Location 1 or 2?



Where's the Russian River?

Email between WTI staff on 12/9/2004:

Could you contact with CDEC to make the following things clear?

*1) At link: <http://cdec.water.ca.gov/misc/realStations.html>, RUSSIAN RIVER NEAR HOPLAND HOP has lat,long of 39.026,122.407 .
Currently we use this table for WeatherShare.*

2) At link: http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=HOP, RUSSIAN RIVER NEAR HOPLAND has lat.,long. of 39.0260°N , 123.1290°W.

The second link gives us the right location.

So, is the first link table obsolete or just an error for Russian River HOP station? We need a correct CDEC stations list to input to the WeatherShare system.

Where's the Russian River?

Email from WTI to CDEC on 12/10/2004:

I have some concerns over the quality of the CDEC data pushed to the WeatherShare server.

First, I noticed December 8 morning that one of the CDEC station (DUN) had a wind speed of 206mph. In another incident, the air temperature of a station was way out of range. I noticed that you do have QC for your data, but somehow the data pushed to WeatherShare are not quality controlled. Is it possible that you only push the QC'ed data to WeatherShare?

*Second, currently we are using the table at <http://cdec.water.ca.gov/misc/realStations.html> for station locations (e.g., RUSSIAN RIVER NEAR HOPLAND HOP has lat,long of 39.026,122.407), but there is another table at http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=HOP (RUSSIAN RIVER NEAR HOPLAND has lat.,long. of 39.0260°N , 123.1290°W) which has the correct information. Is the information at first link obsolete or it's just an error for Russian River HOP station? Could you send me a CDEC stations list with correct geo-locations? **I would also love to be notified whenever there is a change/update to station location.***

Where's the Russian River?

Email response from CDEC on 12/17/2004:

Our data is QC'ed post-process, though there are some checks done at the instrumentation level. We are not currently set up to provide data exchange for post-processed (QC'ed) data. **We emphasize that our data is preliminary** and is used to primarily monitor current weather and hydrologic conditions as it relates to river forecasting and water supply. **We are not an official source of historic climate data.** For data that has been thoroughly QC'ed, I refer you to the Western Region Climate Center at <http://www.wrcc.dri.edu/>

The page at <http://cdec.water.ca.gov/misc/realStations.html> was updated as of the date posted on the page. For the latest metadata on a specific station, use <http://cdec.water.ca.gov/cgi-progs/staMeta>. I have updated the page [realStations.html](http://cdec.water.ca.gov/misc/realStations.html) as of this morning.

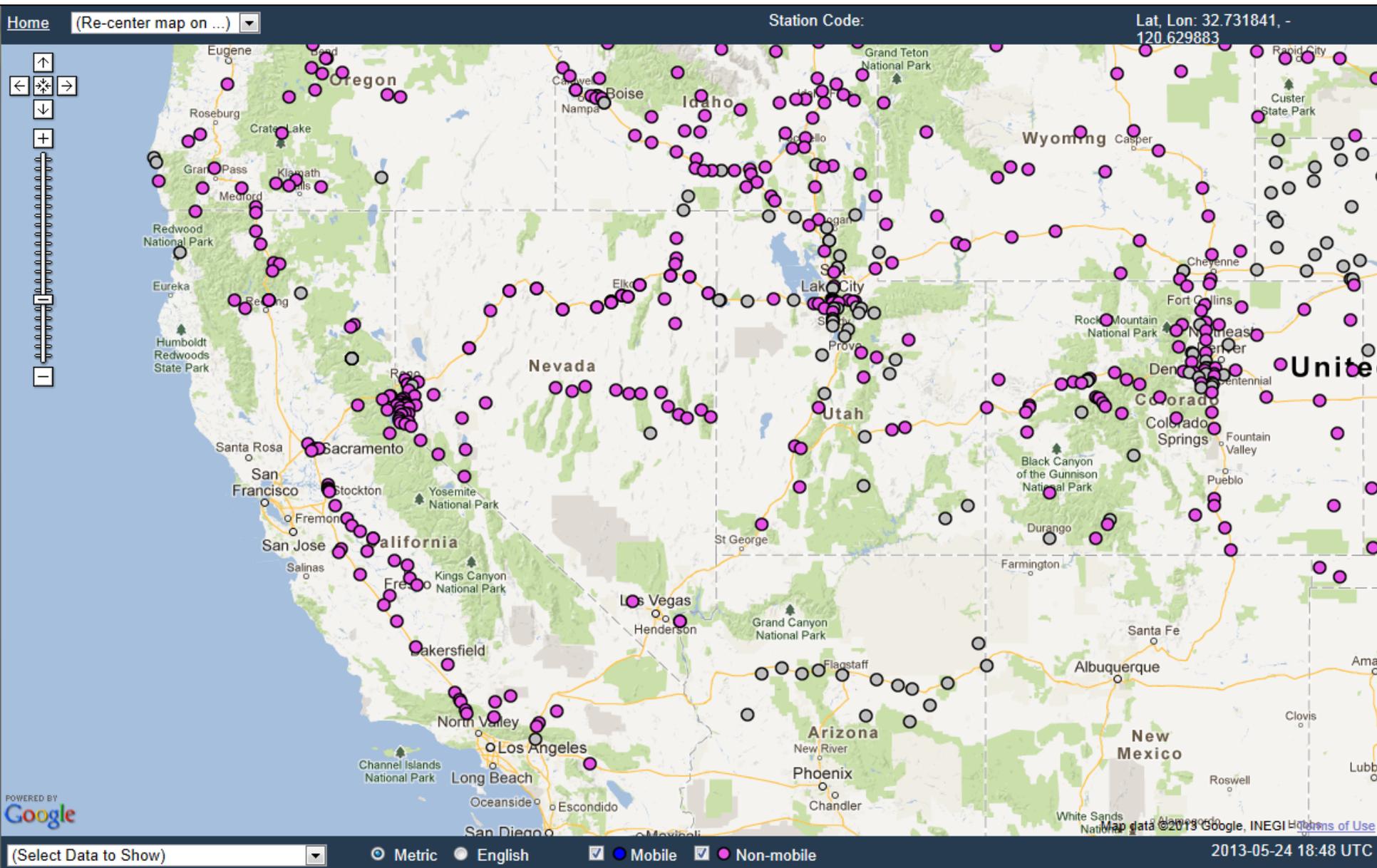
Hope this helps,

Quality Control

Can we do better?

- Report a Problem
- Automated Checks
- Use More Data from Providers
- Look at what others are doing

What are others doing?



Clarus Quality Checking Algorithms

The **sensor range test** detects sensor readings that fall outside the range of sensor hardware specifications or theoretical limits (i.e., a maximum and minimum value).

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

*The **climate range test** detects sensor readings that fall outside predetermined climate range values.*

- The climate range data have been drawn from 30 years of National Centers for Environmental Prediction-Department of Energy (NCEP-DOE) Reanalysis 2 data.*
- For each weather parameter, the climate range values used in this test were determined by computing monthly minimum and maximum values over a 2.5 degree x 2.5 degree fixed latitude-longitude grid. In the latitude band, this equates to a grid spacing of 172.5 miles. In the longitude band, this varies from 172.5 miles at the equator, to 0 miles at the poles.*

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

*The **step test** detects sensor readings whose values change by more than a predefined variable-specific or station-specific rate over a thirty minute (past) and five minute (future) configurable period. For example, an air temperature reading from 2:00 p.m. will be compared to the corresponding air temperature sensor readings from the same sensor that was recorded in the time range of 1:30 p.m. to 2:05 p.m.*

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

*The **like instrument test** detects sensor readings whose values differ from the average of all sensor values obtained from the same station with the same weather parameter type by more than a predefined variable-specific threshold. For example, if there were four surface temperatures at the same station, the sensor reading being evaluated would be compared to the average of all of the surface temperatures against the threshold (positive and negative).*

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

*The **persistence test** detects sensor readings whose values remain constant for a predefined variable-specific period of time. For example, if consecutive pressure sensor readings remain unchanged to the precision of the instrument for four hours, the current sensor reading does not pass the persistence test.*

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

The **IQR spatial test** is a method for checking whether a sensor reading is consistent with its neighboring sensor readings. It detects sensor readings that differ by more than a predefined threshold from an expected value within a neighborhood of the target sensor reading.

A target sensor reading does not pass the IQR test when

$$|Z_e - Z_0| > \max(M * 0.7413 * IQR, \text{minToleranceBound})$$

where

Z_e = Median of neighbors

Z_0 = Target sensor reading

M = Multiplier value: The value is 3 for all fields, except Relative Humidity, which is 2.5

IQR = Interquartile range: The difference between the .25 and .75 percentiles of the neighbors. The coefficient 0.7413 makes the IQR an unbiased estimate of the true standard deviation σ

minToleranceBound = A fixed value set for each field that bounds the minimum acceptable spread between the target sensor value and the estimate.

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

The IQR test is only effective and thus only run if there are 5 or more Automated Surface Observing Systems (ASOS), Automated Weather Observing Systems (AWOS), and/or Environmental Sensor Station (ESS) neighbors that satisfy all of the following conditions:

- *Within a 69 mile radius of the target sensor reading*
- *Within +/- 350 meters of elevation*
- *Within 1 hour of the target sensor reading time*

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

Barnes Spatial Test

Like the IQR test, the neighboring stations used for spatial comparison are determined by a formula based on configurable tolerance bounds. Unlike the IRQ test, neighboring sensor readings are weighted according to their distance from the original sensor, with the weight decreasing exponentially with the distance from the station. In the *Clarus System*, neighboring values (Z_i) are based on ASOS, AWOS, and ESS *in situ* data.

A target observation does not pass the Barnes Spatial Test when the target observation value (Z_0) falls outside of the range defined by the number of configured standard deviations about the weighted mean of the neighboring observations (Z_e).

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

Barnes Spatial Test

An observation does not pass the Barnes Spatial Test when:

$$|Z_e - Z_0| > SdMin * \sigma$$

Where

Z_0 = Target observation

Z_e = Weighted mean of neighboring observations

Z_i = The i th neighboring observation

SdMin = The configured allowable standard deviations

σ = Estimated standard deviation

and where the weighted mean is computed as follows:

$$Z_e = (\sum W(r_i) * Z_i) / (\sum W(r_i))$$

where

$$W(r_i) = \exp(-|Z_i - Z_0|^2 / (2 * (r_i / \sigma)^2))$$

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

Barnes Spatial Test

The Barnes spatial test only runs when the IQR test does not run and if there are 2 or more ASOS, AWOS and/or ESS neighbors that satisfy all of the following conditions:

- Within the configured radius of the target observation, typically 69 miles
- Within 65 minutes of the target observation time, -60 minutes to +5 minutes to accommodate potential skewed time reporting

Otherwise, the test will not run.

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

Clarus Quality Checking Algorithms

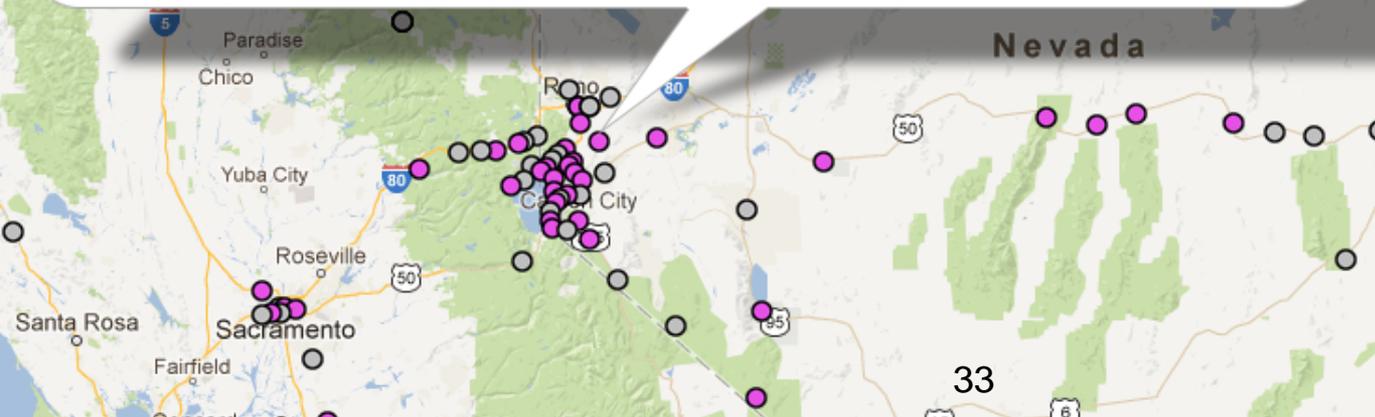
Other Tests:

- **Dewpoint Temperature Test**
- **Sea Level Pressure Test**
- **Precipitation Estimation Test**

http://ntl.bts.gov/lib/38000/38500/38545/TOPR2_508_FHWA-JPO-11-075.pdf

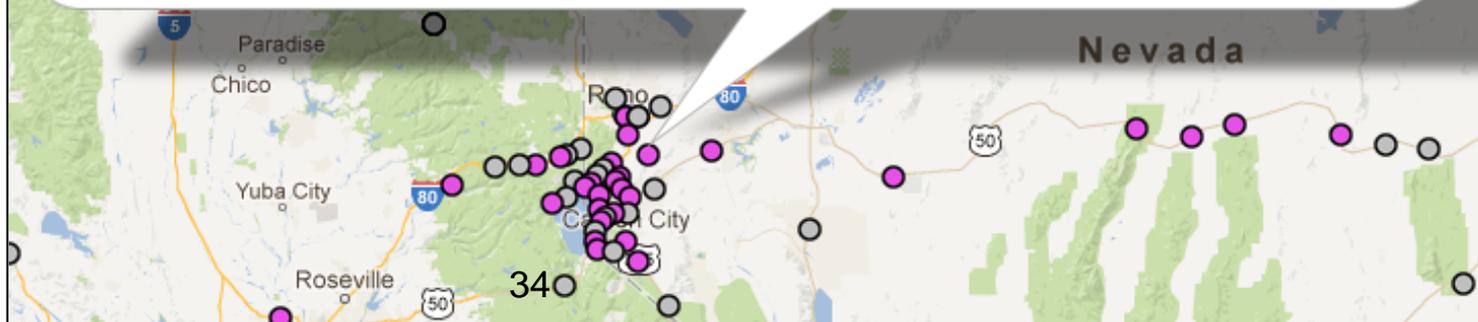
Can you spot the error in this data?

NV29 Highland Flats Lat, Lon: 39.368235, -119.667166 Elevation: 1933 m						Complete	Manual	Sensor Range	Climate Range	Step	Like Instrument	Persistence	IQR Spatial	Barnes Spatial	Dew Point	Sea Level Pressure	Precip Accum
Timestamp (UTC)	Observation Type	Ind	Value	Unit	Conf												
2013-03-06 18:24	essAirTemperature	0	27.10	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essDewpointTemp	0	17.60	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essPavementTemperature	0	35.80	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essPavementTemperature	1	35.20	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essPrecipRate	0	0.00	in/h	100%	●	-	●		●			●	-			
2013-03-06 18:24	essRelativeHumidity	0	67.00	%	100%	●	-	●	●	●		●	●	-	●		
2013-03-06 18:24	essSnowfallAccumRate	0	2.00	ft/s	100%	●	-	●									
2013-03-06 18:24	essSurfaceFreezePoint	0	31.60	F	100%	●	-	●		●							
2013-03-06 18:24	essSurfaceStatus	0	10.00		100%	●	-	●									
2013-03-06 18:24	essSurfaceStatus	1	10.00		100%	●	-	●									
2013-03-06 18:24	essSurfaceTemperature	0	32.20	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essSurfaceTemperature	1	33.40	F	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	windSensorAvgDirection	0	224.00	deg	100%	●	-	●		●		●					
2013-03-06 18:24	windSensorAvgSpeed	0	20.13	mph	100%	●	-	●	●	●		●	●	-			
2013-03-06 18:24	windSensorGustDirection	0	256.00	deg	100%	●	-	●		●		●					
2013-03-06 18:24	windSensorGustSpeed	0	34.00	mph	100%	●	-	●		●		●	●	-			



Or in metric units?

NV29 Highland Flats Lat, Lon: 39.368235, -119.667166 Elevation: 1933 m						Complete	Manual	Sensor Range	Climate Range	Step	Like Instrument	Persistence	IQR Spatial	Barnes Spatial	Dew Point	Sea Level Pressure	Precip Accum
Timestamp (UTC)	Observation Type	Ind	Value	Unit	Conf												
2013-03-06 18:24	essAirTemperature	0	-2.72	C	100%	●	-	●	●	●		●	●	-			
2013-03-06 18:24	essDewpointTemp	0	-8.00	C	100%	●	-	●	●	●		●	●	-			
2013-03-06 18:24	essPavementTemperature	0	2.11	C	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essPavementTemperature	1	1.78	C	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essPrecipRate	0	0.00	cm/h	100%	●	-	●		●			●	-			
2013-03-06 18:24	essRelativeHumidity	0	67.00	%	100%	●	-	●	●	●		●	●	-	●		
2013-03-06 18:24	essSnowfallAccumRate	0	2.00	m/s	100%	●	-	●									
2013-03-06 18:24	essSurfaceFreezePoint	0	-0.22	C	100%	●	-	●		●							
2013-03-06 18:24	essSurfaceStatus	0	10.00		100%	●	-	●									
2013-03-06 18:24	essSurfaceStatus	1	10.00		100%	●	-	●									
2013-03-06 18:24	essSurfaceTemperature	0	0.11	C	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	essSurfaceTemperature	1	0.78	C	100%	●	-	●	●	●	●	●	●	-			
2013-03-06 18:24	windSensorAvgDirection	0	224.00	deg	100%	●	-	●		●		●					
2013-03-06 18:24	windSensorAvgSpeed	0	9.00	m/s	100%	●	-	●	●	●		●	●	-			
2013-03-06 18:24	windSensorGustDirection	0	256.00	deg	100%	●	-	●		●		●					
2013-03-06 18:24	windSensorGustSpeed	0	15.20	m/s	100%	●	-	●		●		●	●	-			





Meteorological Assimilation Data Ingest System

[DOC](#) | [NOAA](#) | [NOAA Research](#) | [ESRL](#) | [GSD](#) | [MADIS HOME](#)

The demands for finer scale meteorological services have increasingly required higher resolution observations to initialize and evaluate weather and climate models, applications, and products. In response to these demands, the National Oceanic and Atmospheric Administration (NOAA) Research (Oceanic and Atmospheric Research (OAR)) Earth System Research Laboratory (ESRL) Global Systems Division (GSD) developed the Meteorological Assimilation Data Ingest System (MADIS) to collect, integrate, quality control (QC), and distribute observations from NOAA and non-NOAA organizations. MADIS leverages partnerships with international agencies; federal, state, and local agencies (e.g. state Departments of Transportation); universities; volunteer networks; and the private sector (e.g. airlines, railroads) to integrate observations from their stations with those of NOAA to provide a finer density, higher frequency observational database for use by the greater meteorological community. MADIS observational products and services were first provided to the public in July of 2001.

MADIS runs operationally in real-time in the National Weather Service (NWS) with a distributed architecture consisting of ingest and distribution services at the [Telecommunications Operations Center \(TOC\)](#) with processing performed at the [National Centers for Environmental Prediction \(NCEP\) Central Operations \(NCO\)](#). MADIS also runs quasi-operationally in a research test environment at ESRL/GSD, where new advances are developed and tested prior to being put into operations. The ESRL/GSD system also has an archive of saved real-time data, and serves as the backup to the operational system.

Note there will be some [differences](#) in the data available from the GSD test environment and from the NWS operational systems.

MADIS subscribers have access to an integrated, reliable, and easy-to-use database containing the real-time and saved real-time observational datasets described below. Also available are real-time gridded surface analyses that assimilate all of the MADIS surface datasets (including the highly-dense integrated mesonet data). The grids are produced by the Rapid Update Cycle (RUC) Surface Assimilation System (RSAS), which incorporates a 15-km grid stretching from Alaska in the north to Central America in the south, and also covers significant oceanic areas. The RSAS grids are valid at the top of each hour, and are updated every 15 minutes.

MADIS ingests data files from NOAA data sources and non-NOAA data providers, decodes the data and then encodes all of the observational data into a common format with uniform observation units and time stamps. Quality control checks are conducted and the integrated data sets are stored in the MADIS database with a series of flags indicating the quality of the observation from a variety of perspectives (e.g. temporal consistency and spatial consistency), or more precisely, a series of flags indicating the results of various QC checks. MADIS users and their applications can then inspect the flags and decide whether or not to use the observation. MADIS data is made available to the enterprise using multiple data transfer protocols via the Internet, including ftp, [Unidata's Local Data Manager \(LDM\)](#) software, [Open source project for Network Data Access Protocol \(OPeNDAP \(formerly DODS\)\)](#) clients, or for the surface datasets through the Text/XML Viewer web service found below. Users can subscribe to the entire database, or ask for only particular datasets of interest.

MADIS also includes an Application Program Interface (API) that provides users with easy access to the observations and quality control information. The API allows each user to specify station and observation types, as well as QC choices, and domain and time boundaries. Many of the implementation details that arise in data ingest programs are automatically performed. Users of the MADIS API, for example, can choose to have their wind data automatically rotated to a specified grid projection, and/or choose to have mandatory and significant levels from radiosonde data interleaved, sorted by descending pressure, and corrected for hydrostatic consistency. The API is designed so that the underlying format of the database is completely invisible to the user. The API can also be used as an OPeNDAP client to access data directly from the MADIS OPeNDAP server.

MADIS data files are compatible with AWIPS-I and AWIPS-I-like display systems and the analysis software provided by the [Local Analysis and Prediction System \(LAPS\)](#), the [Weather Research and Forecasting \(WRF\) Model Variational Data Assimilation System](#), and the [Atmospheric Model Evaluation Tool \(AMET\)](#) provided to the air quality modeling community by the Community Modeling & Analysis System at the University of North Carolina at Chapel Hill. They have also been used to initialize the [Advanced Regional Prediction System \(ARPS\)](#), [MM5](#), and [Coupled Ocean/Atmosphere Mesoscale Prediction System \(COAMPSSM\)](#) forecast models.

The MADIS database and API are freely available to interested parties in the meteorological community.

*MADIS level 1 **validity checks** restrict each observation to falling within a specified set of tolerance limits. Observations not falling within the limits are flagged as failing the respective QC check.*

```

-----
Validity Checks
-----
Dewpoint temperature          -90 - 90 F
Relative humidity              0 - 100 %
Relative humidity 1hr chng    -50 - 50 %
Altimeter                     568 - 1100 mb
Altimeter 1hr change          -10 - 10 mb
Pressure change               0 - 30.5 mb
Sea level pressure            846 - 1100 mb
Station pressure              568 - 1100 mb
Air temperature               -60 - 130 F
Air temperature 1hr change    -35 - 35 F
Wind Direction                0 - 360 deg
Wind Speed                    0 - 250 kts
Visibility                     0 - 100 miles

```

```

Accumulated precip - *h      0 - 44 in
Precipitation rate           0 - 44 in
Soil moisture percent        0 - 100 %
Soil temperature             -40 - 150 F
Wind dir at gust             0 - 360 deg
Wind gust                     0 - 287 mph
24 hour min temperature      -60 - 130 F
24 hour max temperature      -60 - 130 F
Wind dir at hourly max       0 - 360 deg
Wind speed                    0 - 287 mph
Hourly maximum wind speed    0 - 287 mph
Snow cover                    0 - 25 ft
Snow fall - 6h                0 - 50 in
Snow fall - 24h               0 - 300 in
Sea surface temperature       28.4 - 104 F

```

http://madis.noaa.gov/madis_sfc_qc.html

*MADIS level 2 **temporal consistency checks** restrict the temporal rate of change of each observation to a set of specified tolerance limits. Observations not falling within the limits are flagged as failing the respective QC check.*

```
-----  
Temporal Consistency Checks  
-----
```

```
Dewpoint temperature 35 F/hour  
Sea level pressure 15 mb/hour  
Air temperature 35 F/hour  
Wind speed 20 kts/hour  
Soil temperature 5 F/hour  
Sea surface temperature 9 F/hour
```

http://madis.noaa.gov/madis_sfc_qc.html

MADIS level 2 *internal consistency checks*

- *Enforces reasonable, meteorological relationships among observations measured at a single station.*
- *For example, a dewpoint temperature observation must not exceed the temperature observation made at the same station.*
 - *If it does, both the dewpoint and temperature observation are flagged as failing their internal consistency check.*
- *Pressure internal consistency checks include a comparison of pressure change observations at each station with the difference of the current station pressure and the station pressure three hours previous, and a comparison of the reported sea-level pressure with a sea-level pressure estimated from the station pressure and the 12 hour mean surface temperature.*
 - *In the former check, if the reported 3h pressure change observation does not match the calculated ob, then only the reported observation is flagged as bad.*
 - *In the latter check, however, if the reported sea-level pressure does not match the calculated ob, then both the sea-level and station pressure obs are flagged as failing.*

http://madis.noaa.gov/madis_sfc_qc.html

MADIS level 2 *statistical spatial consistency check*

- *Uses weekly QC statistics to mark observations as failed if they failed any QC check 75% of the time during the previous 7 days.*
- *These observations will continue to be marked as failed by this check until such time as the failure rate falls below 25% in the weekly statistics.*
- *This check is only performed on observation types that go through the level 3 spatial consistency check.*

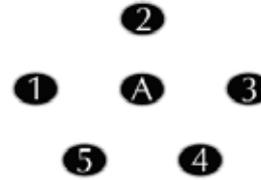
http://madis.noaa.gov/madis_sfc_qc.html

MADIS level 3 *spatial consistency* (or "*buddy*") check

- Based on *Optimal Interpolation (OI)* technique developed by Belousov et al. (1968).
- At each observation location, the difference between the measured value and the value analyzed by OI is computed.
 - If the magnitude of the difference is small, the observation agrees with its neighbors and is considered correct.
 - If, however, the difference is large, either the observation being checked or one of the observations used in the analysis is bad.
 - To determine which is the case, a reanalysis to the observation location is performed by eliminating one neighboring observation at a time.
 - If successively eliminating each neighbor does not produce an analysis that agrees with the target observation (the observation being checked), the observation is flagged as bad.
 - If eliminating one of the neighboring observations produces an analysis that agrees with the target observation, then the target observation is flagged as "good" and the neighbor is flagged as "suspect."
- Suspect observations are not used in subsequent OI analyses.
- To improve the performance of the OI, RSAS analysis fields from the previous hour are used as background grids.

Reanalysis Procedure

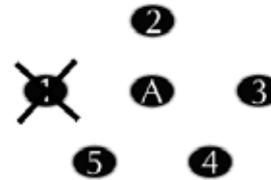
- Original Analysis for Observation A



A = observation being checked
Analysis location

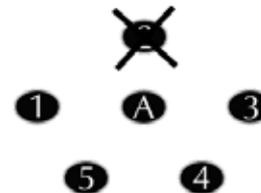
1 ... 5 neighboring observations

- First Reanalysis



Analysis is redone at point A
using observations 2 - 5

- Second Reanalysis



Continue eliminating each
successive observation while
retaining all the others

Belousov, S.L., L.S. Gandin, and S.A. Mashkovich, 1968: *Computer Processing of Current Meteorological Data*. Ed. V. Bugaev. Meteorological Translation No. 18, 1972, Atmospheric Environment Service, Downsview, Ontario, Canada, 227 pp.

http://madis.noaa.gov/madis_sfc_qc.html

LINKS

[What's New](#)

[Current Status](#)

[Help](#)

[ROMAN](#)

Department of
Atmospheric Sciences

Login to My MesoWest

Login:

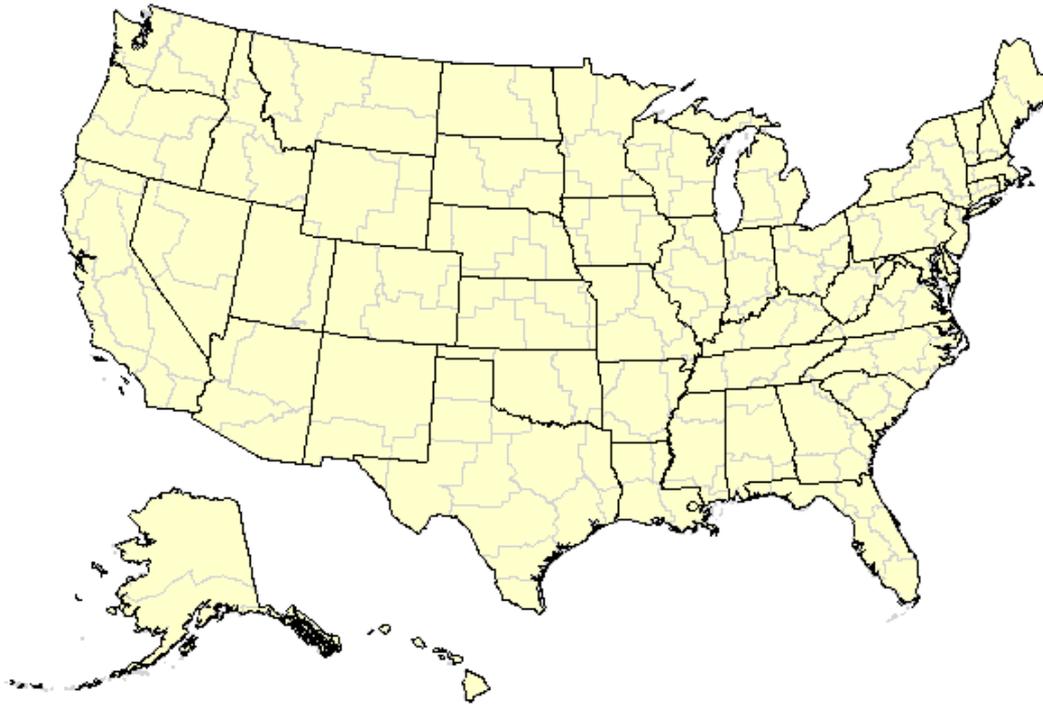
Password:

[Create a User](#)



States

Click on a State to access weather observations



[States](#)

[CWAs](#)

[Text Only](#)

Observations and Summaries

Region

UTAH

Product

Surface Weather Maps

[University of Utah](#) [Department of Atmospheric Sciences](#)

Copyright © 2002-2012 University of Utah. All Rights Reserved.
For Questions or Comments about this page or MesoWest contact atmos-mesowest@lists.utah.edu

<http://mesowest.utah.edu/>

MesoWest

Mesowest Quality Control

Designation

Description

OK (black)

OK (green)

Caution (orange)

Suspect (red)

Data has passed all Quality Control checks.

Some data has been flagged by one of the statistical checks. This data should be used with caution and examined by the user.

Some data has not passed the any one of the first three checks. It is recommended that this data not be used.

<http://mesowest.utah.edu/html/help/qc.html>

Mesowest Quality Control

"range checks"
ensure any
extraneous values
are flagged as
Suspect

<u>Full Name</u>	<u>Units</u>	<u>QC Min</u>	<u>QC Max</u>
Altimeter	inches Hg	24.00	34.00
Pressure	Mb	600.00	1049.00
Temperature	Fahrenheit	-75.00	135.00
Dew Point	Fahrenheit	-75.00	135.00
Relative Humidity	%	0.00	100.00
Wind Speed	Knots	0.00	125.00
Wind Direction	Degrees	0.00	360.00
Wind Gust	Knots	0.00	150.00
Snow depth	Inches	0.00	500.00
...
Snowfall	Inches	0.00	500.00
Precipitation 1hr	Inches	0.00	2.00
Precipitation 3hr	Inches	0.00	6.00
Precipitation 5min	Inches	0.00	0.50
Precipitation 10min	Inches	0.00	0.50
Precipitation 15min	Inches	0.00	0.50
Road sensor number	N/A	1.00	10.00
Road Temperature	Fahrenheit	-75.00	150.00
Road_Freezing Temperature	Fahrenheit	-75.00	150.00
Road_Surface Conditions	code	1.00	100.00
...

http://mesowest.utah.edu/cgi-bin/droman/variable_select.cgi

Mesowest Quality Control

Temporal consistency check, which restricts the temporal rate of change of each observation to a set of (other) TSP-specified tolerance limits.

	<u>Full Name</u>	<u>Units</u>	<u>QC Min</u>	<u>QC Max</u>
	Altimeter 1hr change	mb	-10	10
	Air temperature 1hr change	Fahrenheit	-35	35
	Dewpoint temperature 1hr change	Fahrenheit	-35	35
	Sea level pressure 1hr change	mb	-15	15
	Wind speed 1hr change	mph	-45	45
	Soil temperature 1hr change	Fahrenheit	-5	5
	Relative Humidity 1hr change	%	-75	75

http://mesowest.utah.edu/cgi-bin/droman/varange_select.cgi

Linear Assumption:

$$\hat{T} = T_0 + \frac{\delta T}{\delta x} \Delta x + \frac{\delta T}{\delta y} \Delta y + \frac{\delta T}{\delta z} \Delta z \quad (1)$$

Multivariate Linear Regression Solution:

$$\begin{bmatrix} n & \sum x & \sum y & \sum z \\ \sum x & \sum x^2 & \sum xy & \sum xz \\ \sum y & \sum xy & \sum y^2 & \sum yz \\ \sum z & \sum xz & \sum yz & \sum z^2 \end{bmatrix} \begin{bmatrix} T_0 \\ \frac{\delta T}{\delta x} \\ \frac{\delta T}{\delta y} \\ \frac{\delta T}{\delta z} \end{bmatrix} = \begin{bmatrix} \sum T \\ \sum Tx \\ \sum Ty \\ \sum Tz \end{bmatrix} \quad (2)$$

USE OF MULTIVARIATE LINEAR REGRESSION
FOR METEOROLOGICAL DATA ANALYSIS
AND QUALITY ASSESSMENT IN COMPLEX TERRAIN

Michael E. Splitt

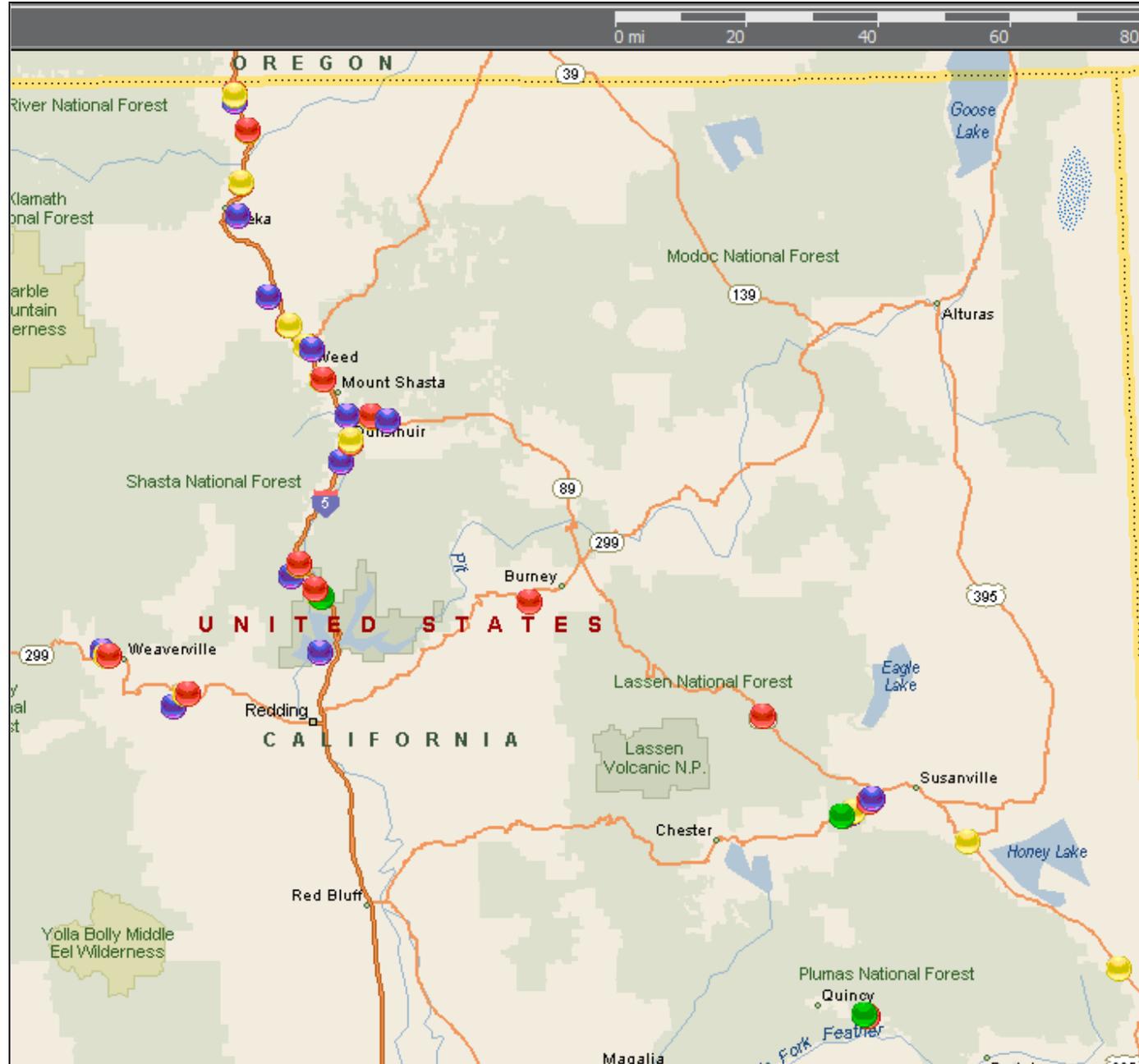
Cooperative Institute For Mesoscale Meteorological Studies, Norman, Oklahoma

Dr. John Horel

University of Utah Department of Atmospheric Sciences, Salt Lake City, Utah

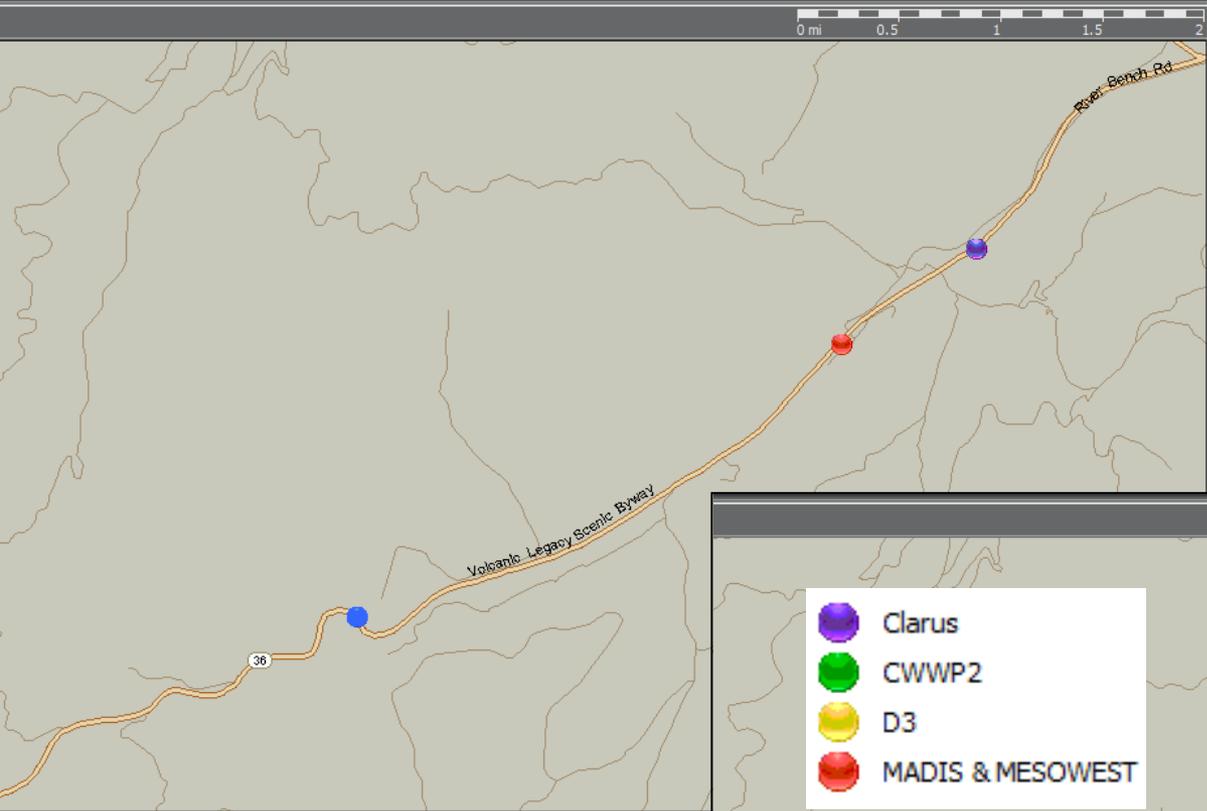
<http://mesowest.utah.edu/html/help/regress.html>

The “Location” Problem (aka metadata)

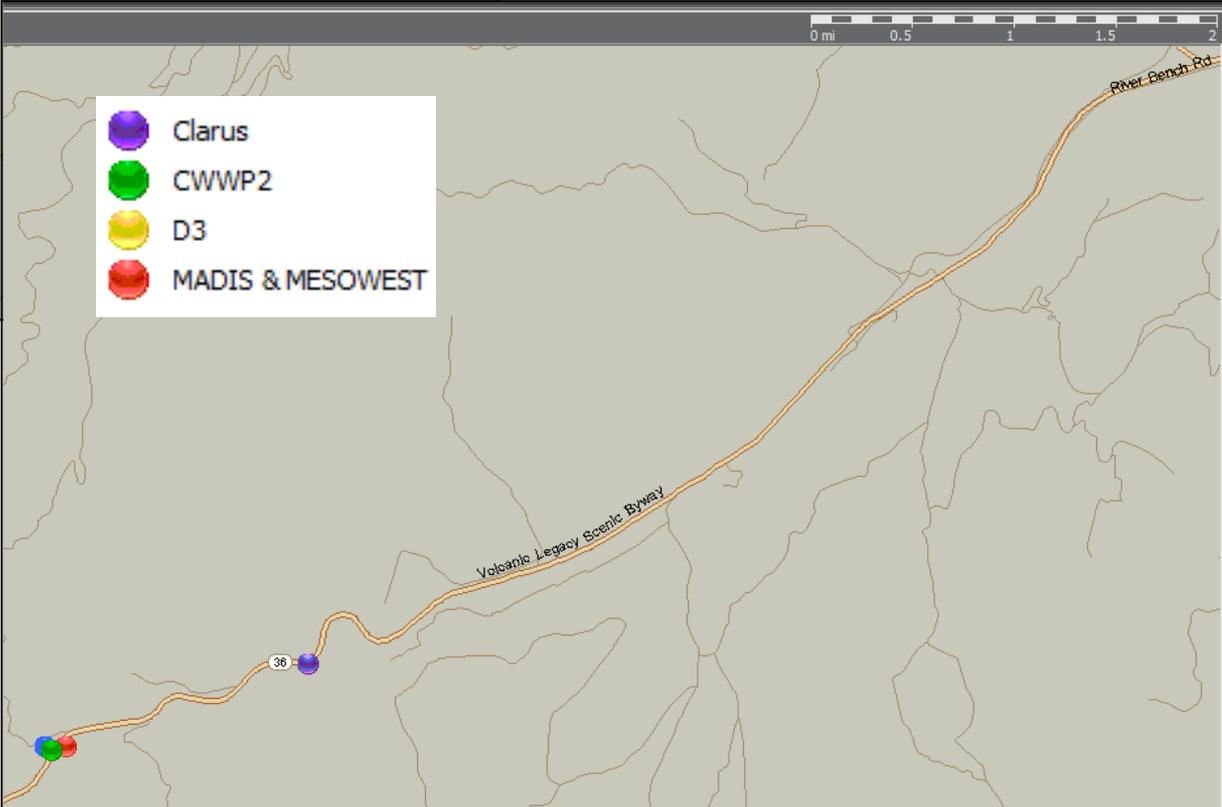


- Clarus
- CWWP2
- D3
- MADIS & MESOWEST

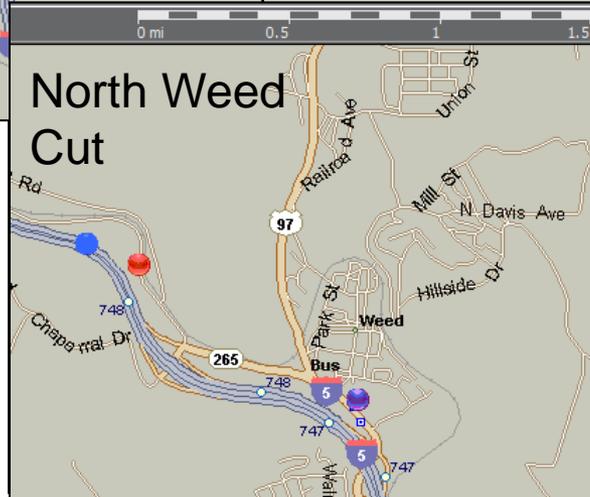
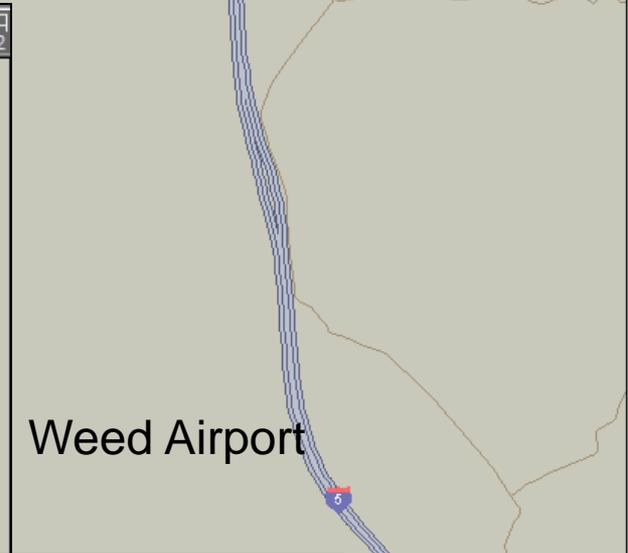
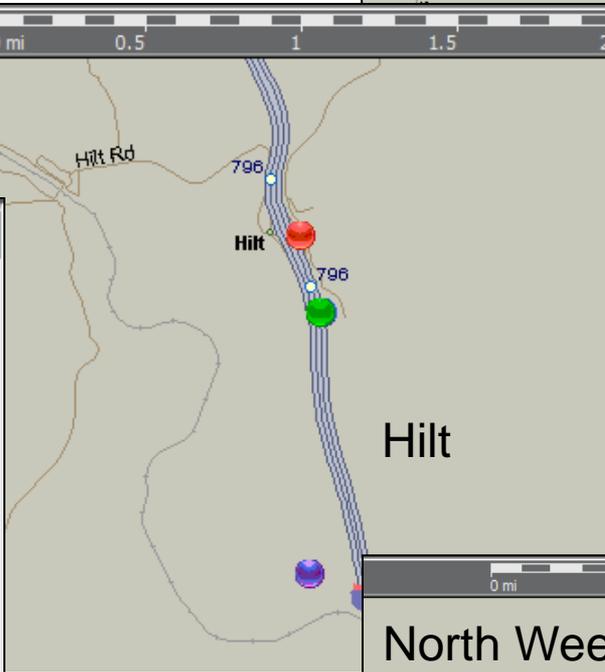
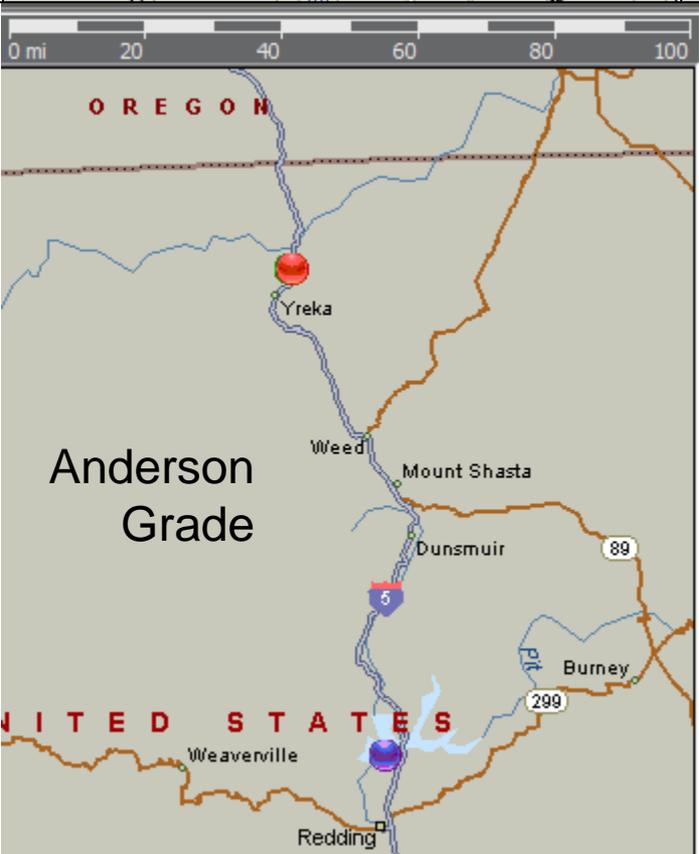
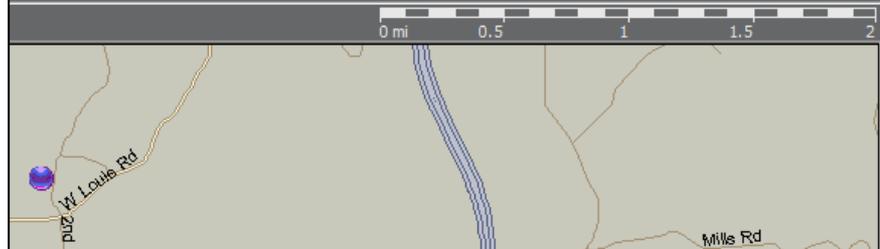
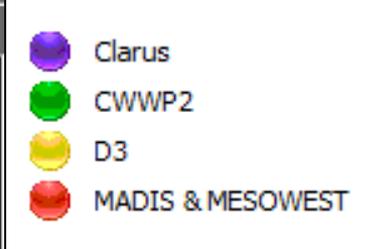
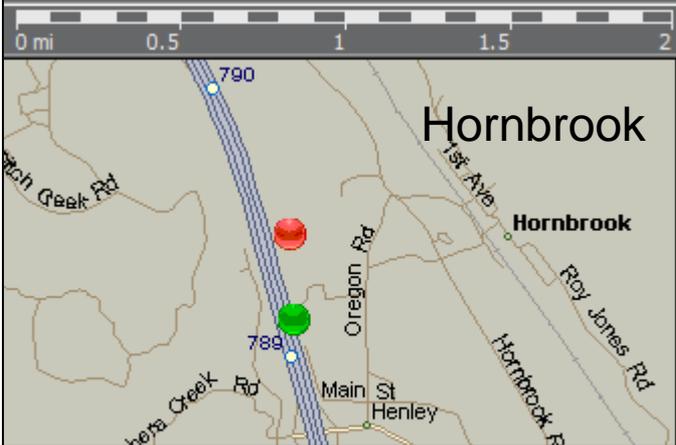
SiteName	CWWP2		D3		Clarus		Mesowest	
	LAT	LON	LAT	LON	LAT	LON	LAT	LON
Anderson Grade	41.79255	-122.58937	41.792546	-122.589081	40.74599	-122.3687	41.7908	-122.5885
AntlersSmtRWIS	40.86709	-122.36559	40.867941	-122.366061	40.74599	-122.3687	40.8848	-122.3826
Black Butte	41.35411	-122.3559	41.354158	-122.355926	41.272858	-122.281087	41.3547	-122.3527
Bogard	40.58548	-121.0887	40.585346	-121.088948	39.91435	-120.81842	40.5857	-121.0883
Buckhorn	40.65457	-122.7608	40.654516	-122.760781	40.625641	-122.796599	40.6545	-122.7545
SnowmanRWIS	41.26848	-122.21339	41.268501	-122.21338	41.2596626	-122.1637726	41.269	-122.2114
Hatchet Mtn	40.85216	-121.76202	40.852517	-121.761882	40.74599	-122.3687	40.85216	-121.76199
Doyle	40.00069	-120.0853	40.000584	-120.085434	39.91435	-120.81842		
Spring Garden	39.91438	-120.8184	39.914358	-120.818366	39.914358	-120.818366	39.9117	-120.8118
Dunsmuir	41.21896	-122.27521	41.219054	-122.275208	41.168708	-122.301707	41.21	-122.2747
HiltRWIS	41.98883	-122.60745	41.988813	-122.607385	41.976158	-122.60818	41.9926	-122.6088
Weed Airport	41.4743	-122.4529	41.474315	-122.452841	41.536729	-122.512748	41.4727	-122.453
HornbrookRWIS	41.90631	-122.56764	41.90632	-122.567616	41.720814	-122.600228	41.9103	-122.5678
Janesville	40.29413	-120.50847	40.29405	-120.508392	39.91435	-120.81842		
Fredonyer Smt	40.36002	-120.86672	40.360326	-120.867283	40.3665009	-120.8418579	40.3603	-120.8653
Oregon Mtn	40.73873	-122.99116	40.738753	-122.990808	40.752108	-123.002803	40.7393	-122.9804
Fredonyer East			40.36961	-120.836764	40.3971291	-120.7768784	40.39	-120.79
Volmers			40.940915	-122.428146	40.91481	-122.45128	40.9418	-122.4268
North Weed			41.429541	-122.402181	41.421643	-122.384189	41.4285	-122.3987

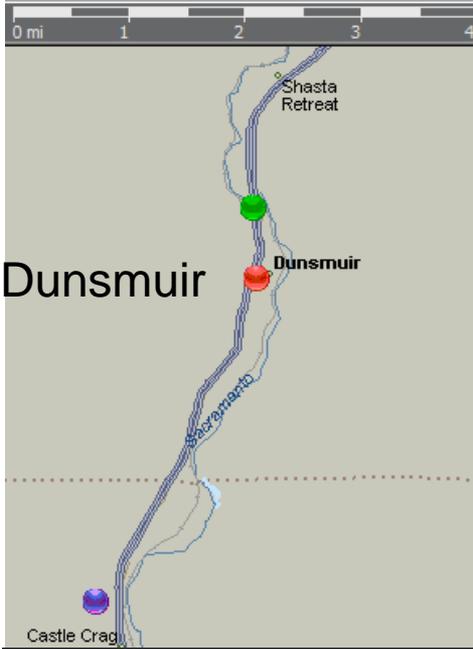


Fredonyer Pass East

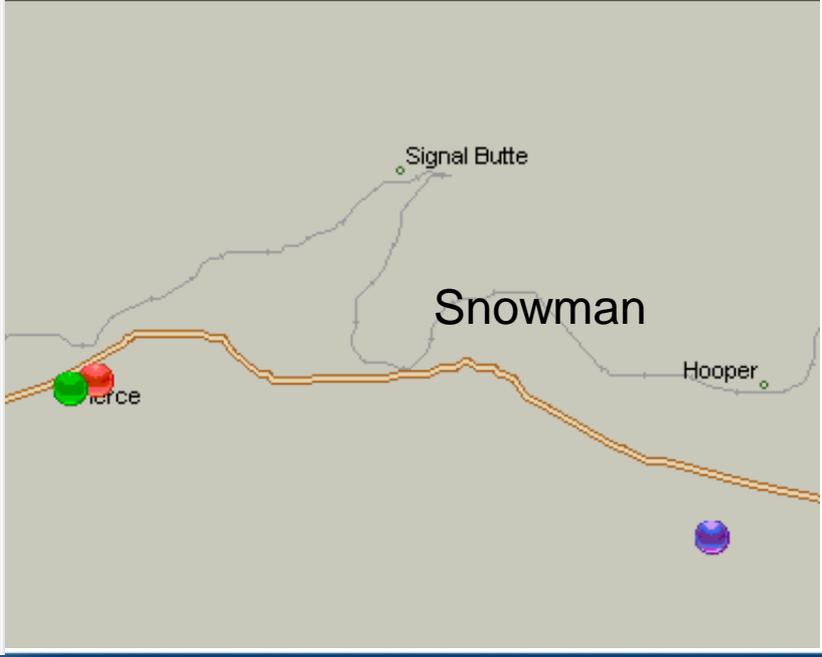
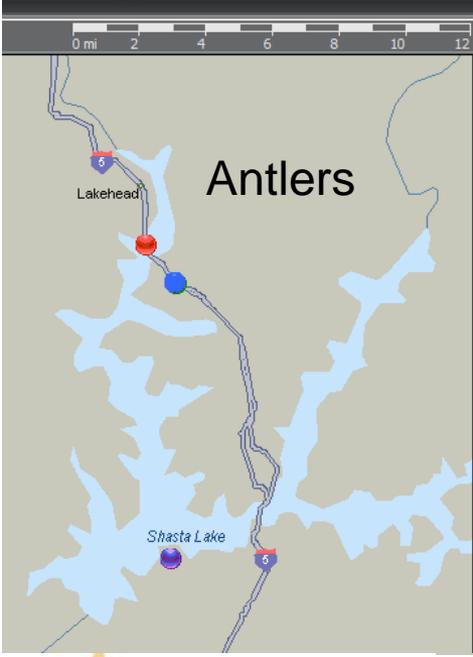
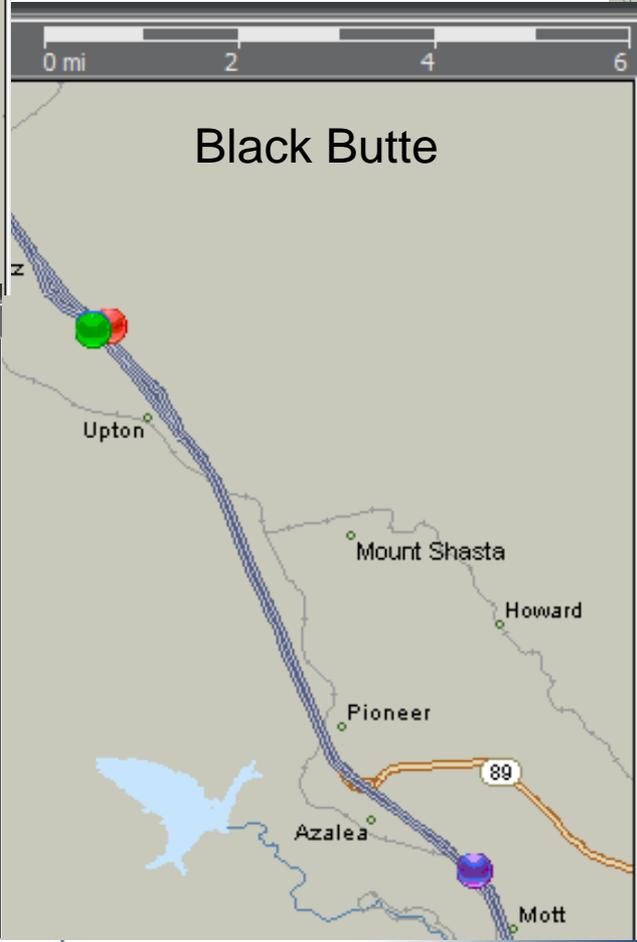
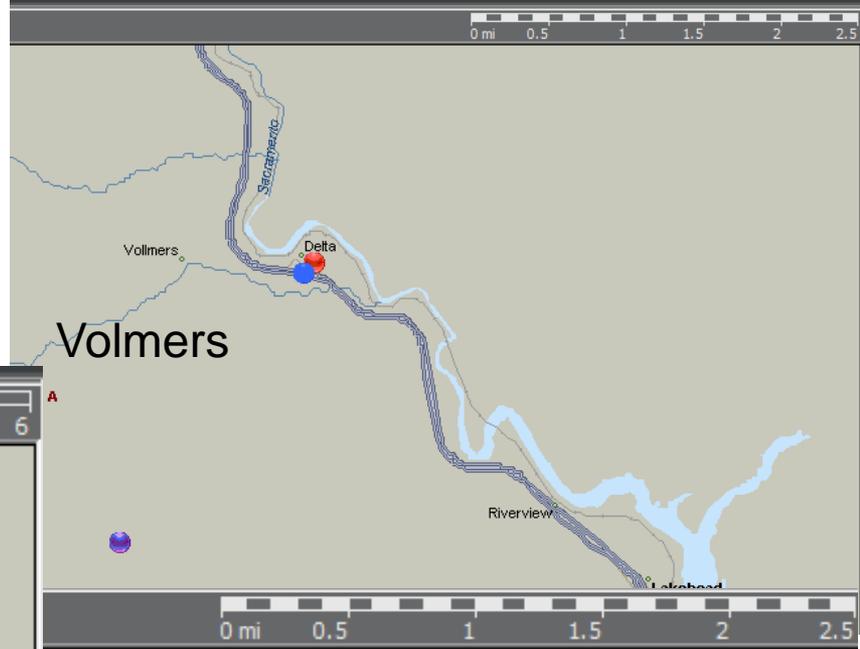


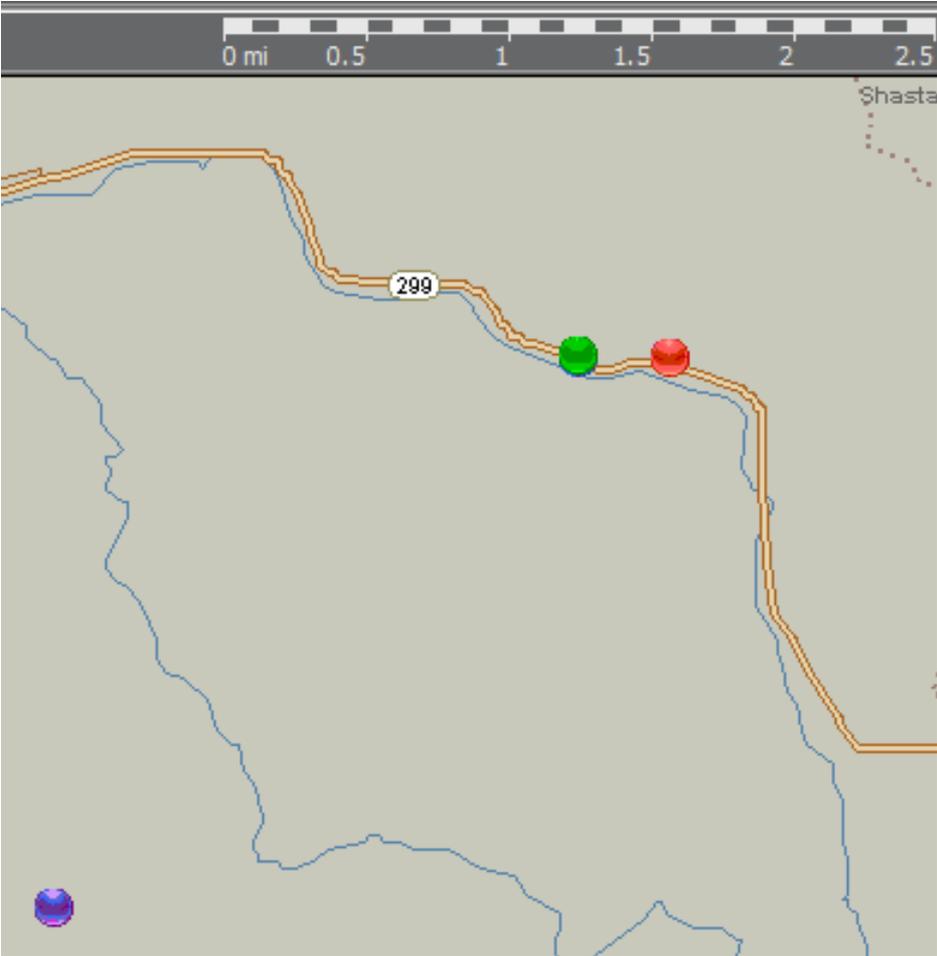
Fredonyer Pass Summit





- Clarus
- CWWP2
- D3
- MADIS & MESOWEST

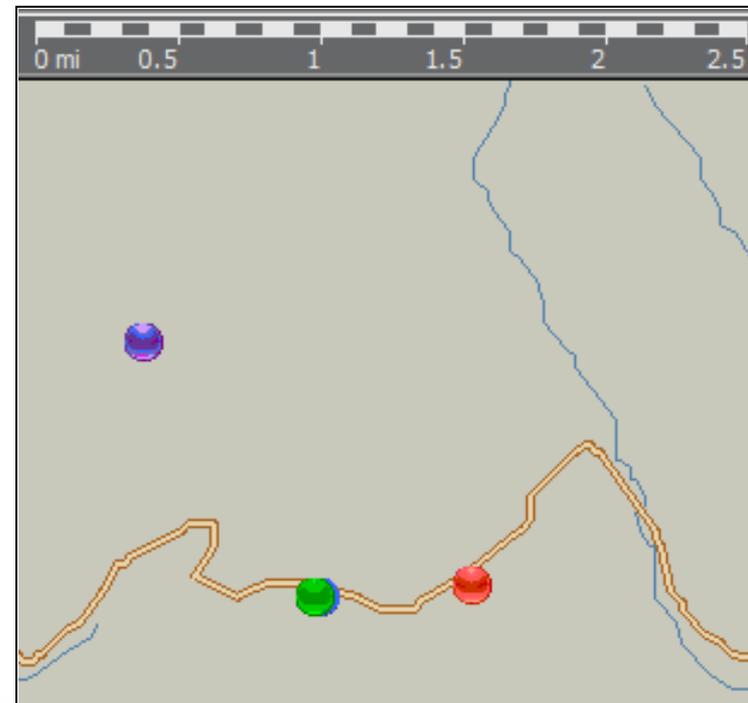




Buckhorn

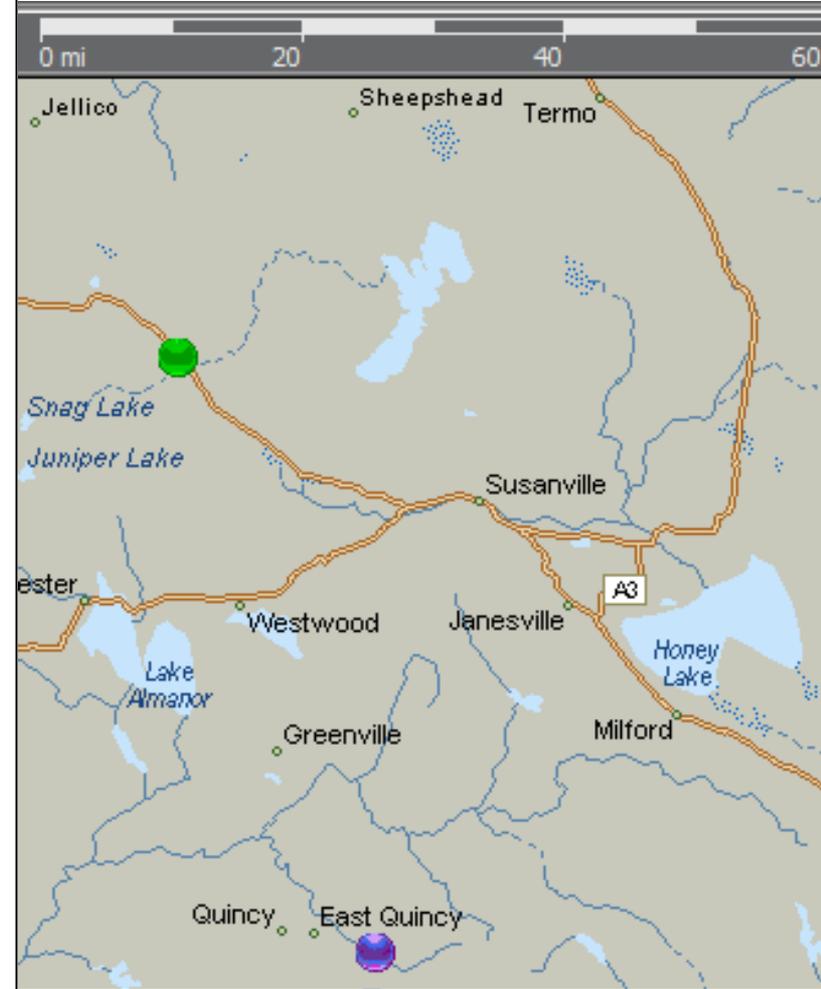
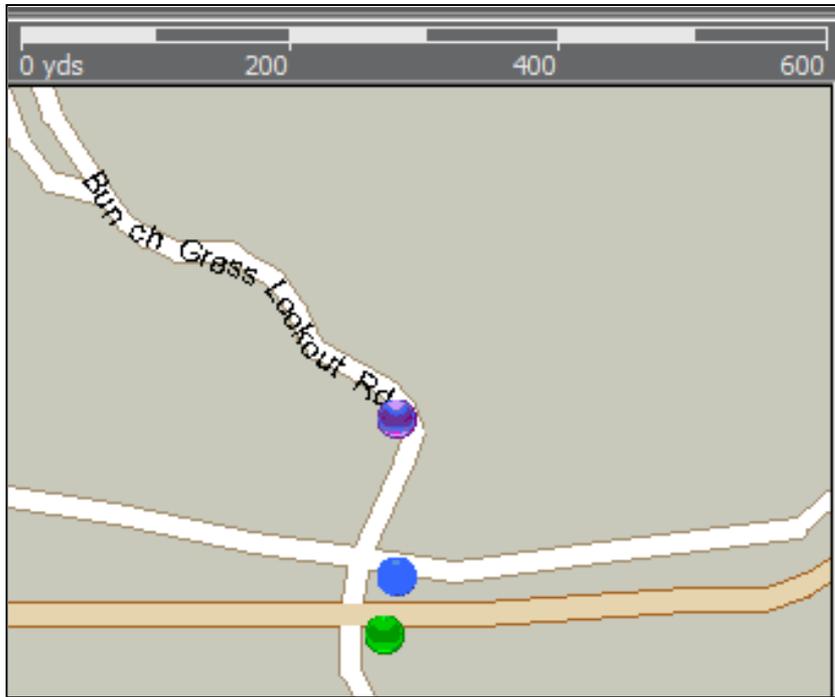
- Clarus
- CWWP2
- D3
- MADIS & MESOWEST

Oregon Mountain

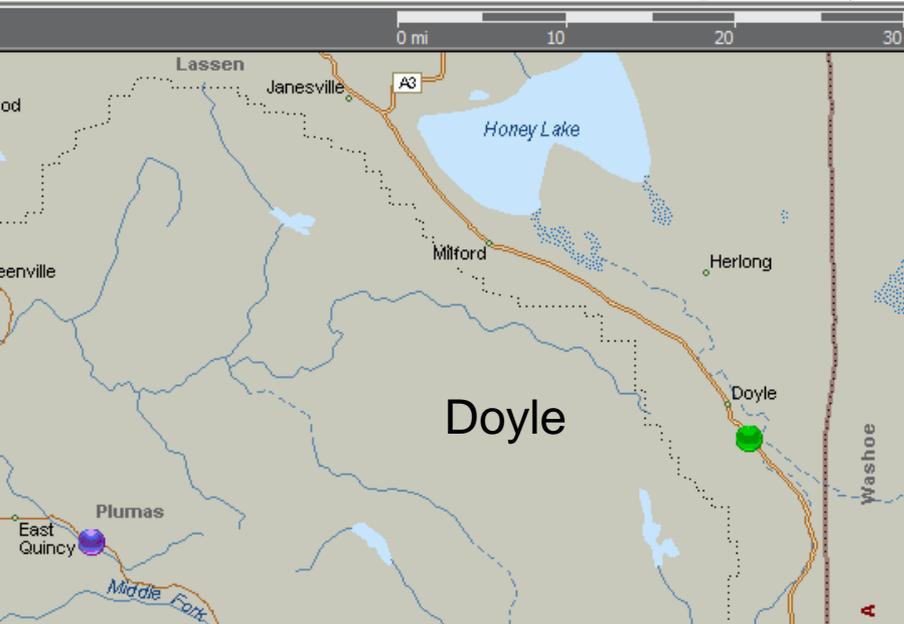


- Clarus
- CWWP2
- D3
- MADIS & MESOWEST

Hatchet



Bogard



A slightly more obvious location problem ...

Road/Travel Conditions | Current Weather | Forecast Weather | Other Info

SHARE f t e ...

Route Planner Map

Gulf of Guinea

Legend: Chain Requirements, Road Information, Incidents, CMS, CCTV, RWIS

- Active CMS
- CCTV Camera
- Construction
- Information
- RMS with Road Temp $\leq 32^\circ$
- Inactive CMS
- Chain Restriction
- Incident
- Commercial Vehicle Information
- RMS

Map data ©2013 Google - Terms of Use

Google

A slightly more obvious location problem ...

The screenshot shows a Google Maps interface with a map of West Africa. The map includes labels for Côte d'Ivoire, Ghana, Togo, and Nigeria. Major cities like Abidjan, Kumasi, Accra, Lome, and Lagos are visible. A legend box is overlaid on the bottom left, listing various map features: Active CMS, Inactive CMS, CCTV Camera, Chain Restriction, Construction, Incident, Information, Commercial Vehicle Information, RWS with Road Temp ≤ 32°, and RWS. The map interface also shows navigation controls, a search bar, and a 'Route Planner' button.

Legend: Chain Requirements, Road Information, Incidents, CMS, CCTV, RWS

- Active CMS
- Inactive CMS
- CCTV Camera
- Chain Restriction
- Construction
- Incident
- Information
- Commercial Vehicle Information
- RWS with Road Temp ≤ 32°
- RWS

Google

A slightly more obvious location problem ...

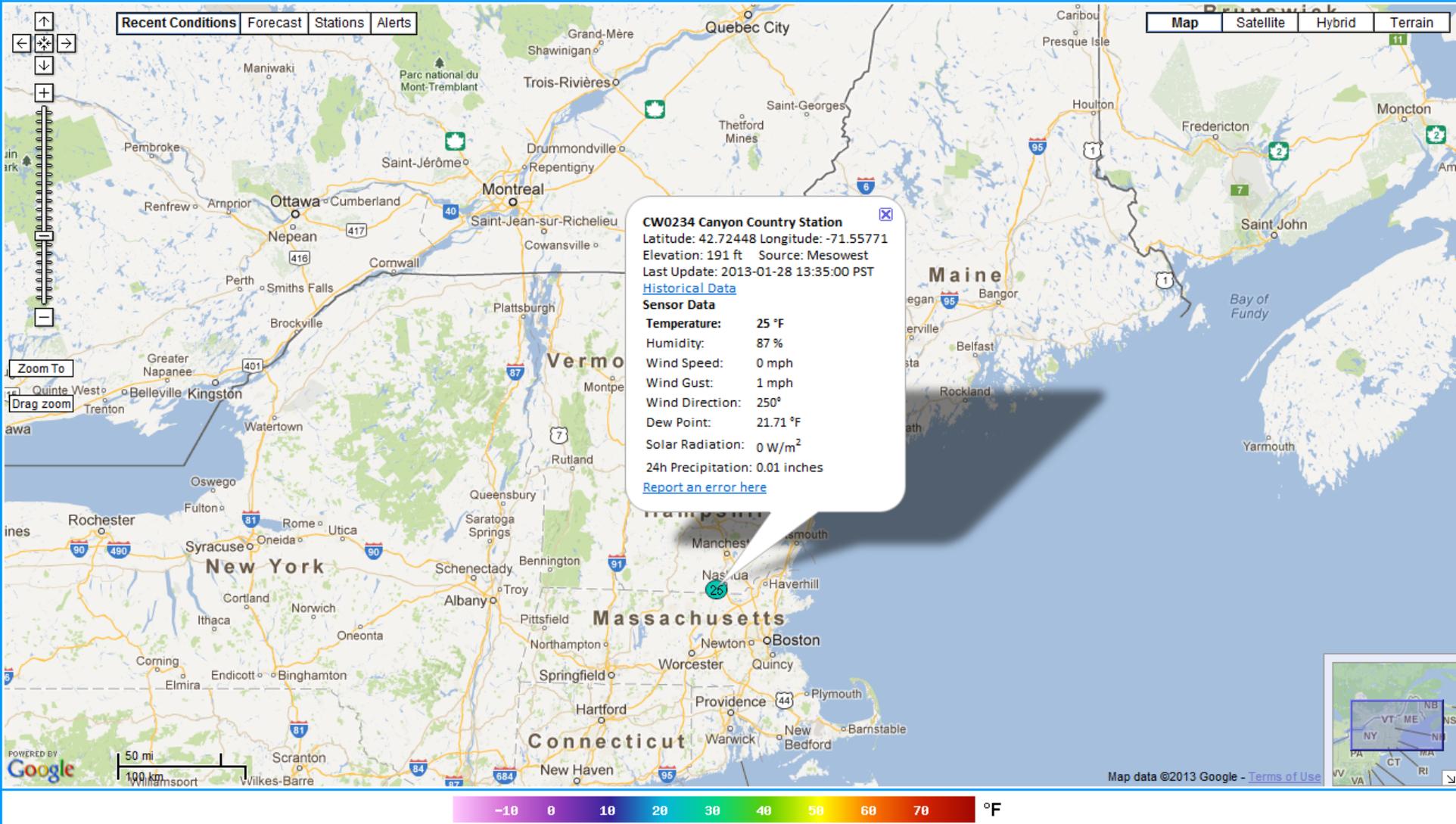
D-8 Daily Log 01/28/2013
 Time: Jan 28 2013 12:02AM
 Detail:

Jan 28 2013 2:03PM : [59] 8-7315 1098 BRK and POTHLES EB 10 JEO ETIWANDA ONR
 Jan
 28 2013 2:02PM : [58] 8-6229 AT 1356: ALL CHAIN CONTROL LINES OF 13, 14, 18, and 19 ARE ALL R-0 (EX: 13A,13B,13C, ETC)
 Jan 28 2013 2:01PM : [57] 8-6325 AT 1354: CHAIN LINES 11A, 11B, 11C, 11D, 10D, 10C and 36D ARE ALL R-0
 Jan 28 2013 2:00PM : [56] LOG 051/IN00879 - NB 15 TO WB 91 CON, 1032 DOG IN GORE PT, 1039 8-726 AT 1355, IMMS 756336, TMCAL 8-12468
 Jan 28 2013 1:29PM : [55] 8-7214 909-213-9041: REQ BRK SB 215 AT SR91 CON TO FILL POTHLES IN #3 LN AT BLAINE, NEED ALL LNS SLOW, 10 CHP 990/IN00856
 Jan 28 2013 1:27PM : [54] 1039 CHP and HQ-MARK W/ ALL CHAIN CONTROL UPDATES, HQ-MARK ADV HE'S GETTING THE FAXES and UPDATING FROM THAT
 Jan 28 2013 1:17PM : [52] 8-713: CHAIN LINE 22 WAS R-0 AT 1200 and LINE 21 WAS R-0 AT 1230 // OUR LIST DOESN'T SHOW THAT LINE 22 HAD CHAIN I CALLED IT IN THIS MORNING AT APPROX 0720 // OK I'LL CHANGE THEM TO R-0
 Jan 28 2013 1:10PM : [50] 8-7315: REQ BRK EB 10 AT MILLIKEN FOR POTHLES IN #3 LN JEO ETIWANDA ONR, NEED ALL LNS SLOW and P/L ETIWANDA ONR, WE'LL WAVE OFF THE UNIT WHEN 1098, 1039 CHP 857/IN00822
 Jan 28 2013 1:09PM : [49] 8-7315: EB 10 JEO ETIWANDA ONR, WMA BLK PANTS and BLUE SHIRT W/ LONG SLEEVE UNDER IT, WALKING R/S CHP 881/IN00828
 Jan 28 2013 12:53PM : [48] 8-625: I DON'T KNOW WHO'S 1097 SB 15 AT SUMMIT BUT MY CREW IS NEARBY SO I'M HAVING THEM STOP TO FIND OUT WHO'S THERE and ASSIST IF NEEDED, 1039 CHP ON L 665/IN00774
 Jan 28 2013 12:51PM : [47] LOG 665/IN00774 - SB 15 AT SUMMIT AVE, BABY DONKEY R/S and CT UNIT W/ HIM, CHP REQ CONTACT W/ CT THAT'S 1097, 1039 8-625 AT 1250 ADV HE'S NOT SURE WHO'S OUT BUT WILL FIND OUT and CALL US BACK
 Jan 28 2013 12:44PM : [46] LOG 716/IN00787 - SR18 JSO CLIFFHANGER, ROCKS IN DOWNBOUND LN, 1039 8-624 AT 1240 ADV CREW IS DOING ROCK RUNS THRU AREA ALL DA NEEDED
 Jan 28 2013 12:41PM : [45] 8-6229: CHAIN LINE 13D IS R-0
 Jan 28 2013 12:36PM : [44] 8-621: CHAIN LINES 17D, 17E and 18A ALL R-0

Legend: Chain Requirements, Road Information, Incidents, CMS, CCTV, RWIS

- Active CMS
- CCTV Camera
- Construction
- Information
- RWS with Road Temp ≤ 32°
- Inactive CMS
- Chain Restriction
- Incident
- Commercial Vehicle Information
- RWS

Recent Conditions - Air Temperature - 1:49PM Mon Jan 28 PST



© Copyright 2008 [Western Transportation Institute](#), Montana State University - Bozeman

Check the WeatherShare Stations Table:

```
dgalarus@wtidgalarus7 /d/_temp/_temp/qualitycontroldocumentation/screenshots
$ grep "Canyon Country" wxshare_stations.out
1415      C0234      CW0234 Canyon Country      42.72448      -71.55771      \N191CAM
esowest  2013-01-28 22:35:00      6      6      0      14      30.538LA
2701      C0234      CW0234 Canyon Country      34.39717      -118.44670      7531CAMA
DIS      2007-09-05 19:31:00      8      9      0      Los Angeles      1430.538
LA
```

Check MADIS Historical Data:

```

U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
1 APRSWXNET      278.705566 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      278.149994 U 91  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      277.594452 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
1 APRSWXNET      278.149994 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      278.149994 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      277.594452 U 91  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      277.594452 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      277.594452 S 27  0
U-T      C0234      531.00  34.39717 -118.4467  0.000  0.000 20070105_1
0 APRSWXNET      277.594452 S 27  0

```

```

U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_060
4 APRSWXNET      270.927765 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_063
4 APRSWXNET      270.927765 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_070
5 APRSWXNET      271.483337 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_073
4 APRSWXNET      271.483337 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_080
4 APRSWXNET      271.483337 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_083
4 APRSWXNET      271.483337 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_090
4 APRSWXNET      271.483337 U 123  0
U-T      C0234      58.20  42.72448 -71.5577  0.000  0.000 20121202_093
4 APRSWXNET      271.483337 U 123  0

```

Are there others?

Latitude > 42 ?

```
mysql> select * from Stations where latitude > 42;
```

station_id	name	display_name	latitude	longitude	district	elevation	state	data_source	latest	zoom	zoomprec	RWIS	County	Highway	PM	CO
1415	C0234	CW0234 Canyon Country	42.72448	-71.55771	NULL	191	CA	Mesowest	2013-01-28 22:05:00	6	6	0		14	30.538	LA
187	KOKH	Oceanside: Oceanside Municipal	48.25150	-122.67370	NULL	505	CA	Mesowest	2008-12-31 15:56:00	6	9	0		76	1.500	SD

2 rows in set (0.00 sec)

Latitude < 32.5 ?

```
mysql> select * from Stations where latitude < 32.5;
```

station_id	name	display_name	latitude	longitude	district	elevation	state	data_source	latest	zoom	zoomprec	RWIS	County	Highway	PM	CO
3167	TS748	SNF01 PORTABLE	0.00000	0.00000	NULL	0	CA	Mesowest	2010-10-20 19:10:00	10	6	0		0	0.000	NULL
1756	AP908	K3NXF-6 Barona Mesa	30.17817	-99.15333	NULL	2034	CA	Mesowest	2012-10-08 12:31:00	99	6	0		0	0.000	SD
2026	CI186	UC-San Luis	32.49300	-114.82600	NULL	46	CA	Mesowest	2013-01-28 06:00:00	8	8	0		0	0.000	

3 rows in set (0.00 sec)

Longitude < -125 ?

```
mysql> select * from Stations where longitude < -125;
Empty set (0.00 sec)
```

Longitude > -114 ?

```
mysql> select * from Stations where longitude > -114;
```

station_id	name	display_name	latitude	longitude	district	elevation	state	data_source	latest	zoom	zoomprec	RWIS	County	Highway	PM	CO
1756	AP908	K3NXF-6 Barona Mesa	30.17817	-99.15333	NULL	2034	CA	Mesowest	2012-10-08 12:31:00	99	6	0		0	0.000	SD
1415	C0234	CW0234 Canyon Country	42.72448	-71.55771	NULL	191	CA	Mesowest	2013-01-28 22:05:00	6	6	0		14	30.538	LA
3167	TS748	SNF01 PORTABLE	0.00000	0.00000	NULL	0	CA	Mesowest	2010-10-20 19:10:00	10	6	0		0	0.000	NULL

3 rows in set (0.00 sec)

(Partial) **Solutions**
(and more problems)

Stations - All Stations Status - 11:18AM Tue Jan 29 PST

Map Satellite Hybrid Terrain

Recent Conditions Forecast Stations Alerts

Stations:

All

Source	Total	Up to date	Outdated
RWIS	107	57	50
Madis	690	397	293
Mesowest	2474	1010	1464
Total	3271	1464	1807

Note that the overall total includes some redundancy, with redundant station data provided by both MADIS and MesoWest. The redundant storage of data is intentional, for the purpose of continued service in the event of an outage from either provider.

I-40 Barstow Station

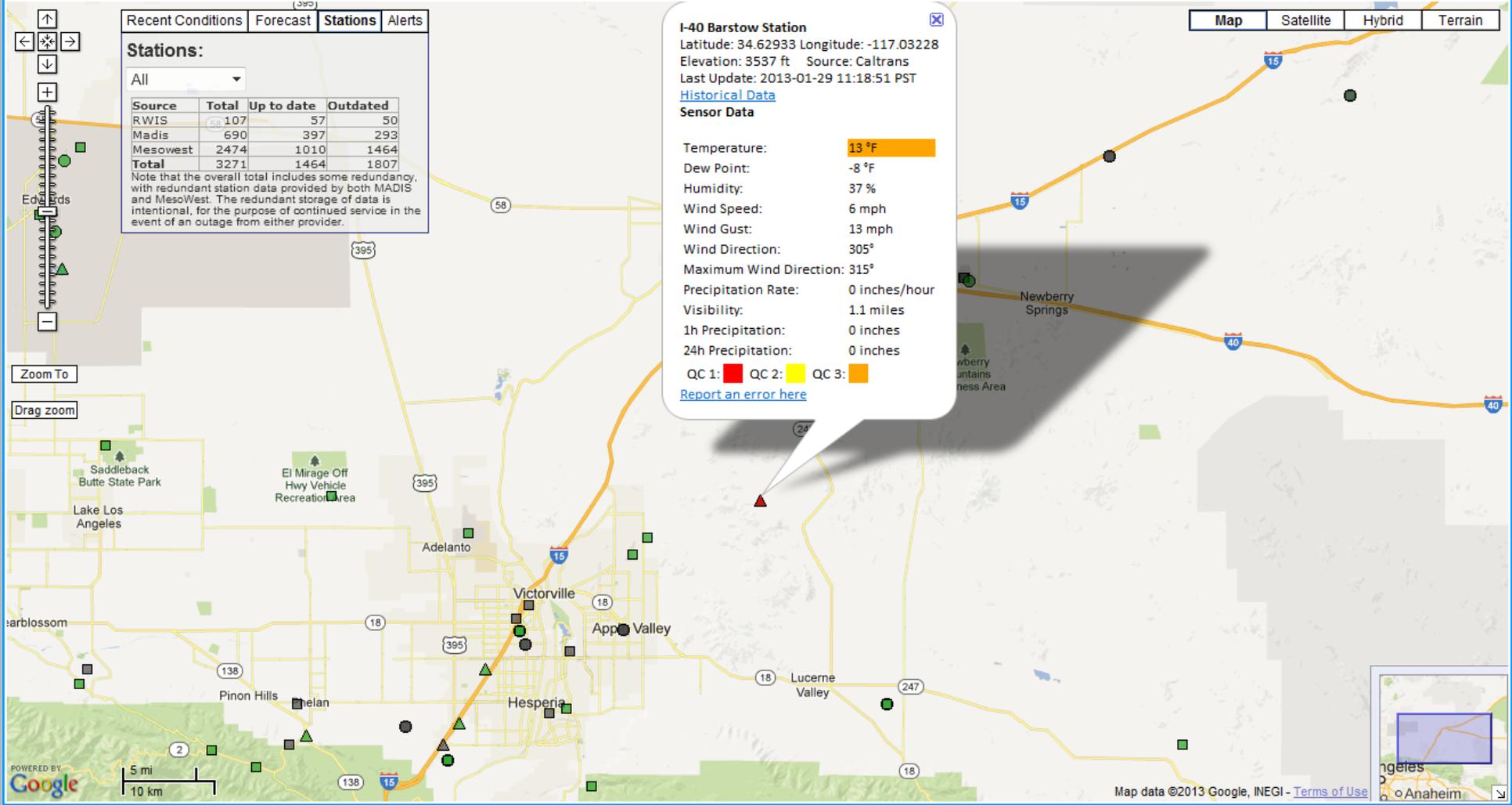
Latitude: 34.62933 Longitude: -117.03228
 Elevation: 3537 ft Source: Caltrans
 Last Update: 2013-01-29 11:18:51 PST
[Historical Data](#)

Sensor Data

Temperature: **13 °F**
 Dew Point: -8 °F
 Humidity: 37 %
 Wind Speed: 6 mph
 Wind Gust: 13 mph
 Wind Direction: 305°
 Maximum Wind Direction: 315°
 Precipitation Rate: 0 inches/hour
 Visibility: 1.1 miles
 1h Precipitation: 0 inches
 24h Precipitation: 0 inches

QC 1: ■ QC 2: ■ QC 3: ■

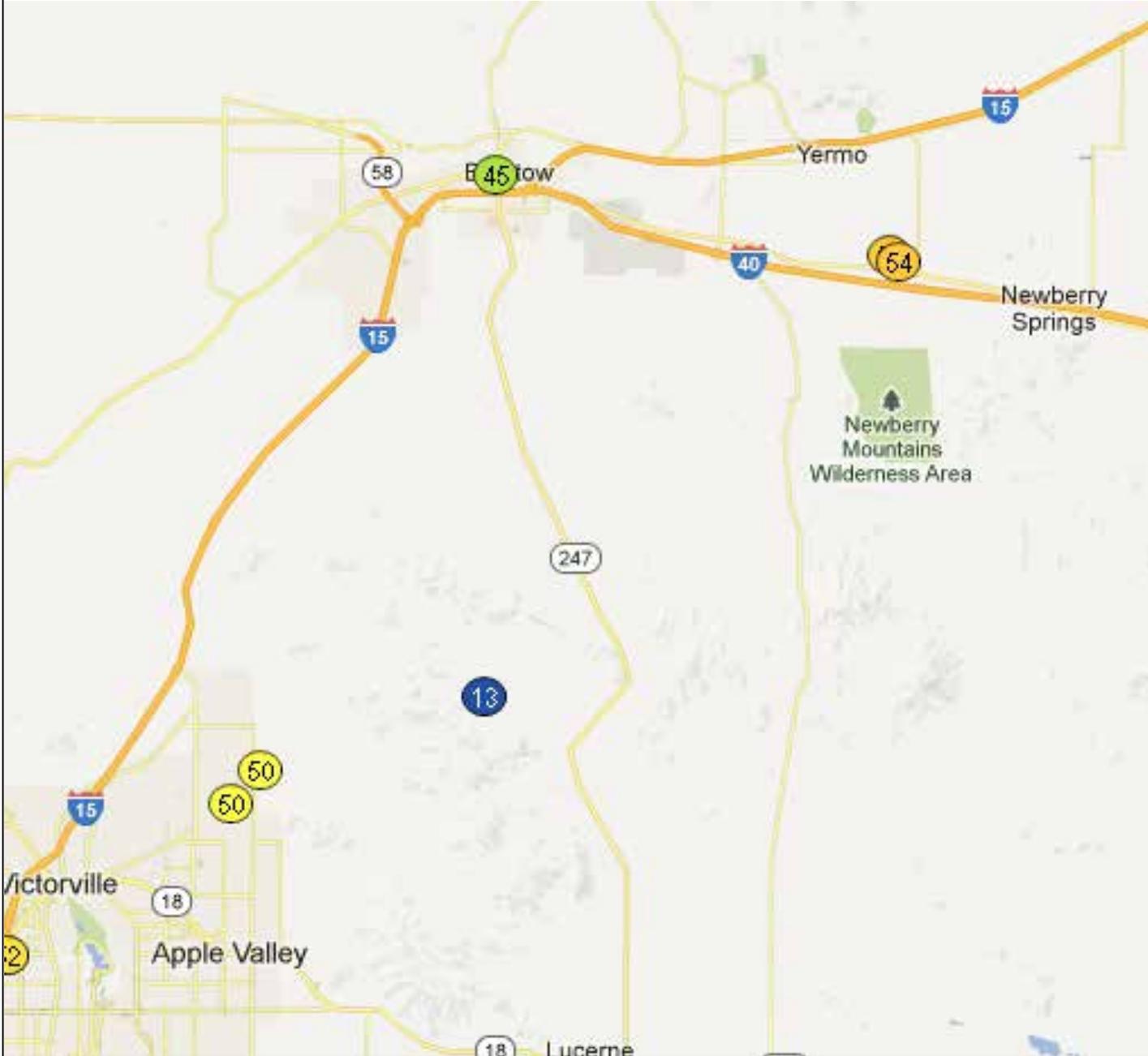
[Report an error here](#)



▲ RWIS ■ Mesowest ● Madis updated ≤ 90 mins ▲ ■ ● > 90mins ▲ ■ ● updated ≤ 90 mins, but failed at least 1 QC

Map data ©2013 Google, INEGI - Terms of Use

© Copyright 2008 [Western Transportation Institute](#), Montana State University - Bozeman



Yep, it looks like a problem.

WeatherShare Phase 2 Demonstration

Stations - All Stations Status - 11:18AM Tue Jan 29 PST

Map Satellite Hybrid Terrain

Recent Conditions Forecast Stations Alerts

Stations:

All

Source	Total	Up to date	Outdated
RWIS	107	57	50
Madis	690	397	293
Mesowest	2474	1010	1464
Total	3271	1464	1807

Note that the overall total includes some redundancy, with redundant station data provided by both MADIS and MesoWest. The redundant storage of data is intentional, for the purpose of continued service in the event of an outage from either provider.

I-40 Barstow Station

Latitude: 34.62933 Longitude: -117.03228
 Elevation: 3537 ft Source: Caltrans
 Last Update: 2013-01-29 11:33:48 PST
[Historical Data](#)

Sensor Data

Temperature: 14 °F
 Dew Point: -8 °F
 Humidity: 36 %
 Wind Speed: 16 mph
 Wind Gust: 24 mph
 Wind Direction: 285°
 Maximum Wind Direction: 305°
 Precipitation Rate: 0 inches/hour
 Visibility: 1.1 miles
 1h Precipitation: 0 inches
 24h Precipitation: 0 inches

[Report an error here](#)



Zoom To
Drag zoom

Saddleback Butte State Park
 Lake Los Angeles
 El Mirage Off Hwy Vehicle Recreation Area
 Adelanto
 Victorville
 Apple Valley
 Lucerne Valley
 Hesperia
 Pinon Hills
 5 mi / 10 km



Map data ©2013 Google, INEGI - Terms of Use

▲ RWIS ■ Mesowest ● Madis updated ≤ 90 mins ▲ ■ ● > 90mins ▲ ■ ● updated ≤ 90 mins, but failed at least 1 QC

© Copyright 2008 Western Transportation Institute, Montana State University - Bozeman

I-40 Barstow Station

Latitude: 34.62933 Longitude: -117.03228
Elevation: 3537 ft Source: Caltrans
Last Update: 2013-01-29 11:33:48 PST
[Back to date selection](#)

93 readings, displaying 71 - 80:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2013-01-29 14:03:58	-2593	-15 °F	O	0	X
2013-01-29 14:19:11	-2584	-15 °F	O	0	X
2013-01-29 14:34:04	-2548	-14 °F	O	0	X
2013-01-29 14:48:52	-2521	-13 °F	O	0	X
2013-01-29 15:03:51	-2521	-13 °F	O	0	X
2013-01-29 15:19:05	-2494	-13 °F	O	0	X
2013-01-29 15:33:46	-2449	-12 °F	O	0	X
2013-01-29 15:48:43	-2377	-11 °F	O	0	X
2013-01-29 16:03:51	-2297	-9 °F	O	0	X
2013-01-29 16:18:56	-2200	-8 °F	O	0	X

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

I-40 Barstow Station

Latitude: 34.62933 Longitude: -117.03228
Elevation: 3537 ft Source: Caltrans
Last Update: 2013-01-29 11:33:48 PST
[Back to date selection](#)

93 readings, displaying 81 - 90:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2013-01-29 16:33:59	-2077	-5 °F	O	0	X
2013-01-29 16:49:06	-1904	-2 °F	O	0	X
2013-01-29 17:03:49	-1750	0 °F	O	0	X
2013-01-29 17:18:56	-1640	2 °F	O	0	X
2013-01-29 17:33:57	-1553	4 °F	O	0	X
2013-01-29 17:48:47	-1451	6 °F	O	0	X
2013-01-29 18:03:45	-1408	7 °F	O	0	X
2013-01-29 18:18:50	-1357	8 °F	O	0	X
2013-01-29 18:34:00	-1280	9 °F	O	0	X
2013-01-29 18:48:54	-1169	11 °F	O	0	X

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

Not a problem anymore?

I-40 Barstow Station

Latitude: 34.62933 Longitude: -117.03228
Elevation: 3537 ft Source: Caltrans
Last Update: 2013-01-29 11:33:48 PST
[Back to date selection](#)

93 readings, displaying 91 - 93:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2013-01-29 19:03:48	-1109	12 °F	O	0	X
2013-01-29 19:18:51	-1049	13 °F	O	0	X
2013-01-29 19:33:48	-980	14 °F	O	0	0

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

Report a problem:

User Feedback

[Unresolved reports](#) | [Resolved reports](#) | [All reports](#) | [Logout](#)

17 report(s), displaying 1 - 17

[Mark as Resolved](#) | [Mark as Unresolved](#) | [Delete](#) |

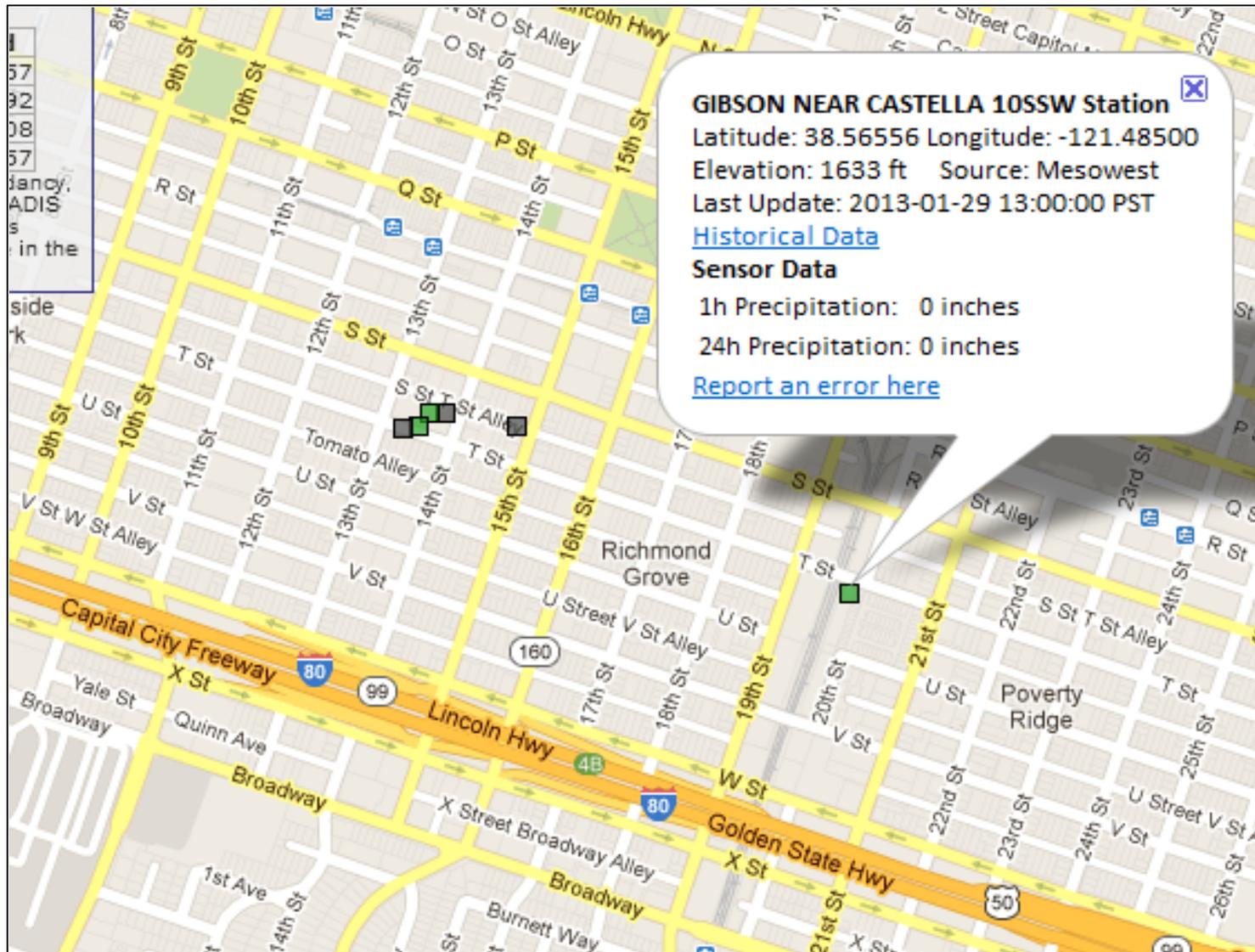
<input type="checkbox"/>	Rep. No	Date	Type	Station Name, ID	Message
<input type="checkbox"/>	182	2013-01-29 15:36:54	0	GIBSON NEAR CASTELLA 10SSW, 2107 enable	This station is in the wrong location. C...
<input type="checkbox"/>	181	2013-01-29 12:25:50	0	CW0234 Canyon Country, 1415 enable	
<input type="checkbox"/>	180	2013-01-08 22:38:12	1	I-40 Barstow, 29 disable	wrong temp data. off 40 deg f.
<input type="checkbox"/>	179	2013-01-08 22:37:29	1	I-40 Barstow, 29 disable	wrong temp data. off 40 deg f
<input type="checkbox"/>	178	2012-12-19 12:01:21	1	GIBSON NEAR CASTELLA 10SSW, 2107 enable	This station is registering sub-freezing...
<input type="checkbox"/>	177	2012-11-28 14:45:01	0	GIBSON NEAR CASTELLA 10SSW, 2107 enable	This looks like it may be in the wrong l...
<input type="checkbox"/>	176	2012-07-05 09:58:02	2	Oregon Mountain Summit, 30 disable	I am looking for local barometric data t...
<input type="checkbox"/>	175	2012-04-12 17:42:27	2	Snowmans Summit, 42 disable	downloading CSV data for Snowman Hill al...
<input type="checkbox"/>	174	2011-12-05 14:52:14	2	SOUTH LAKE TAHOE, 3604 disable	The elevation description of station 38 ...
<input type="checkbox"/>	173	2011-07-21 14:59:55	0	North Cushing Creek, 48 disable	I believe this station is shown in the w...
<input type="checkbox"/>	172	2011-03-18 16:35:36	1	RED BLUFF MUNICI, 3637 disable	it list a negative amount of precipitation -0.004
<input type="checkbox"/>	171	2011-02-25 11:08:04	1	NAPA CORPORATION YARD, 1106 disable	temperature seems unusually low compared...
<input type="checkbox"/>	170	2011-02-17 14:50:18	2	MOUNT SHASTA, 3653 disable	The Elevation is wrong. I think there i...
<input type="checkbox"/>	169	2010-12-19 14:17:17	1	CW8514 Ventura, 3717 disable	Rain data for 1Hr
<input type="checkbox"/>	168	2010-12-13 09:08:56	0	GIBSON NEAR CASTELLA 10SSW, 2107 enable	Wrong location.
<input type="checkbox"/>	167	2010-04-19 16:52:37	1	WEED AIRPORT, 809 disable	Wind Direction is opposite of reality an...
<input type="checkbox"/>	166	2010-04-06 16:43:37	1	Richards, 80 disable	it says 212FI can't believe that's true!

[Mark as Resolved](#) | [Mark as Unresolved](#) | [Delete](#) |

```

$ grep GIBSON wxshare_stations.out
2107 GISC1 GIBSON NEAR CASTELLA 10SSW 38.56556 -121.48500316330
A Mesowest 2013-01-28 22:00:00 6 8 0
to 50 1.000 SAC Sacramento

```



Is “Gibson Near Castella” in downtown Sacramento?

[InPrivate](#) <http://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?lat=38.565556&lon=-121.485000&rs>
WeatherShare P...
MESOWEST STA...
MesoWest Su...
38.56556, -121.4...

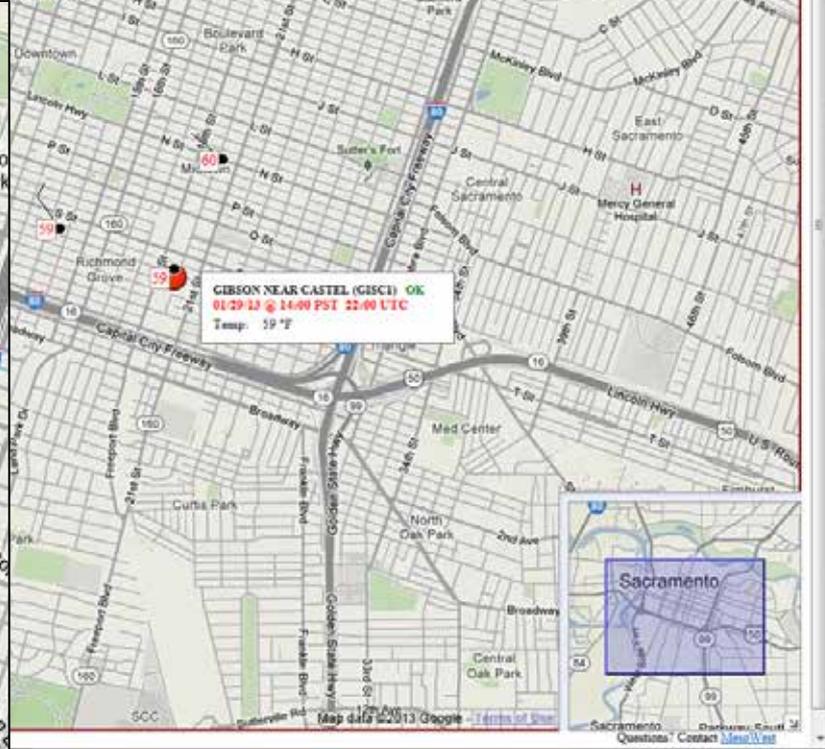
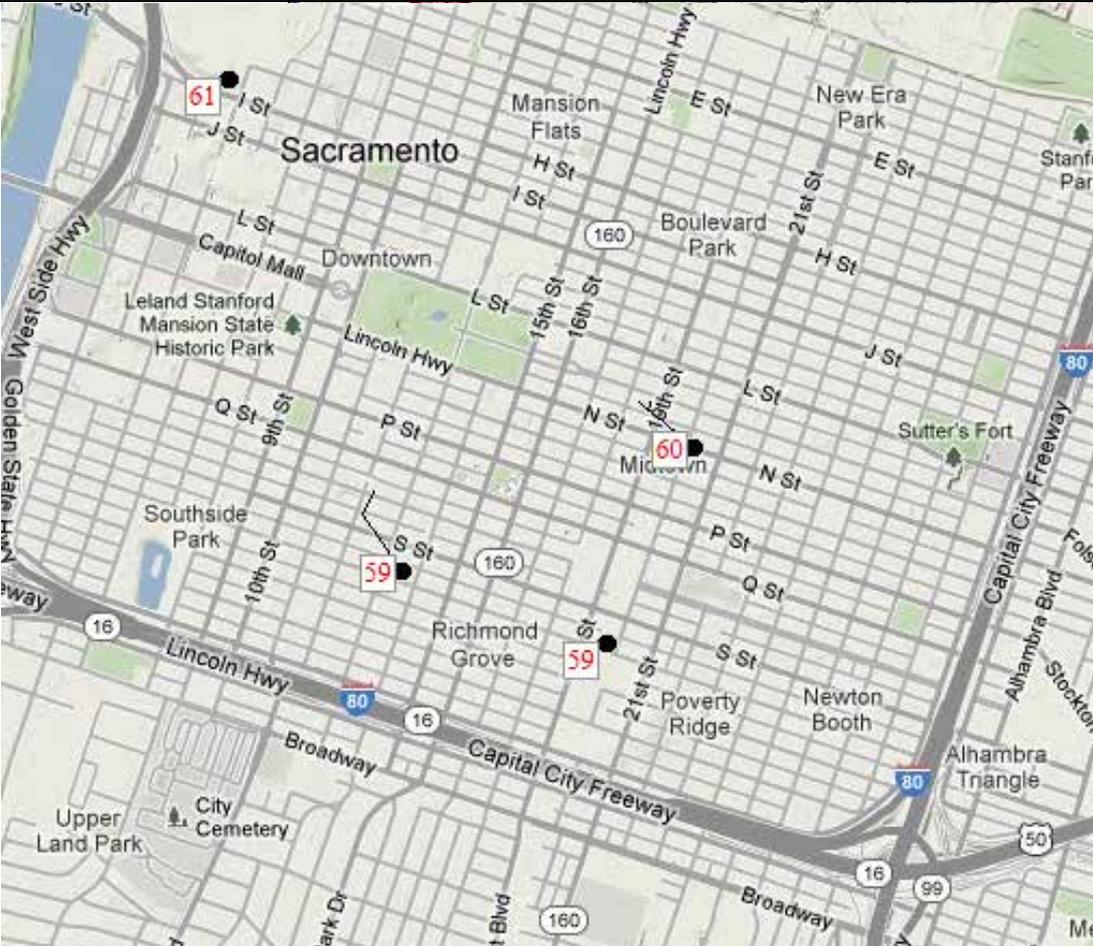
MESO WEST Region: Alaska GCA Product: Surface Weather Maps Go

[Hide Menu](#) [Show Tables](#) Search Active Fires Map Product: Default Change

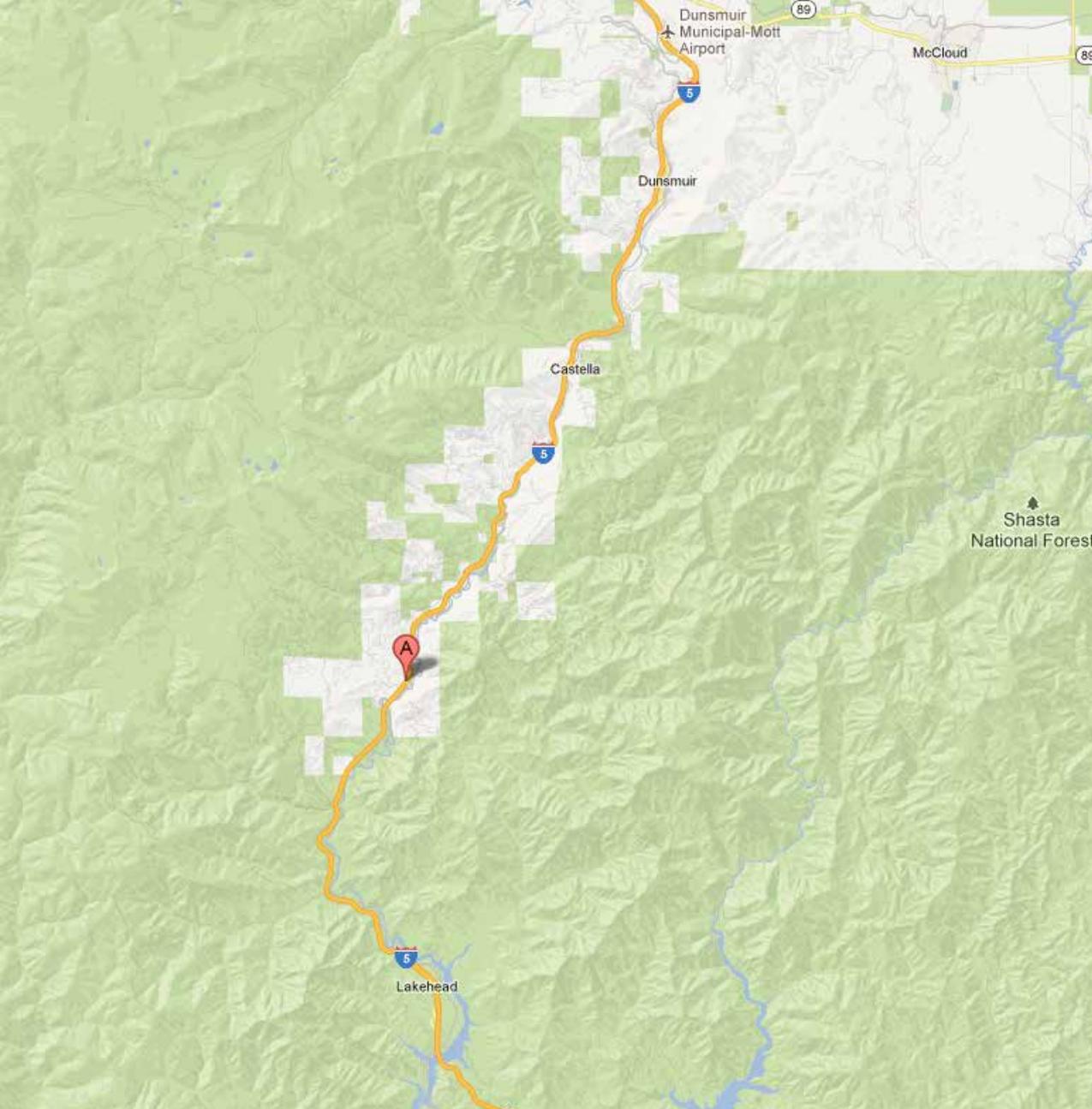
Data Selection
 Region/Zone Radius
 20 Miles Click Point on Map
 Network: All Networks
 Units: English

Most recent observation within 1 hr ending at **22:23 UTC 1/29/2013**

Terrain Map Satellite

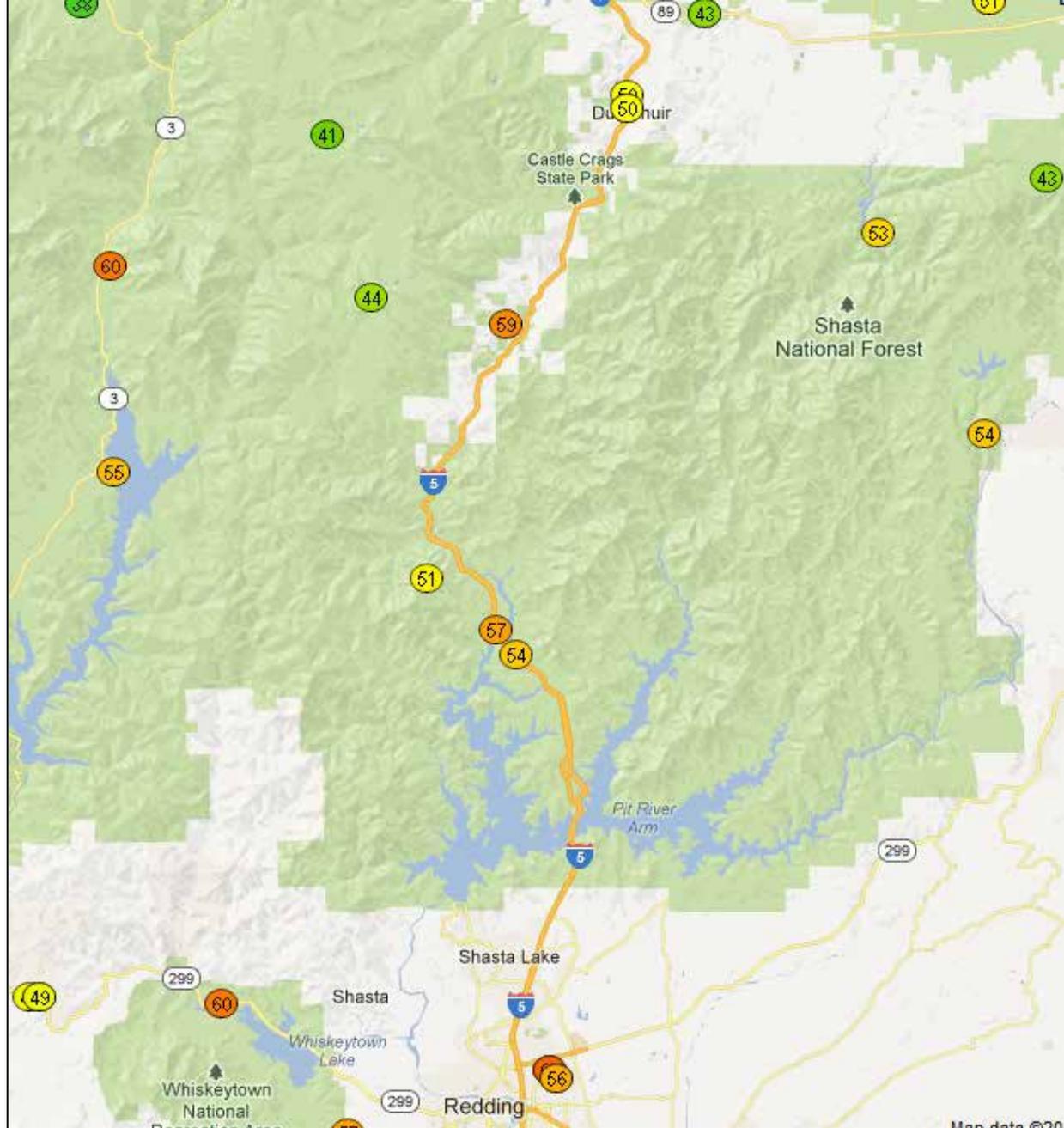


Check MesoWest



Here's Gibson,
which is near
Castella ...

The station doesn't appear to be reported by another provider (MADIS) at Gibson ...



Here's what the problem reporting form looks like:

Weather Station Problem Report Form

Classification: Wrong location

Email address: alarus@coe.montana.edu

Description of the problem:
This station is in the wrong location. Castella and Gibson are north of Redding along I-5.

206 characters remaining

[Submit Feedback](#)

[Return back to sensor display](#)

In conjunction, I could ask the team (Dan) to disable the station, or we could do a bit more investigation to confirm the problem

...

Tobler's First Law of Geography

*"Everything is related to everything else,
but near things are more related than
distant things."*

Tobler W., (1970) "A computer movie simulating urban growth in the Detroit region". *Economic Geography*, 46(2): 234-240.

Compare to Nearby Stations

GIBSON NEAR CASTELLA 10SSW Station

Latitude: 38.56556 Longitude: -121.48500
 Elevation: 1633 ft Source: Mesowest
 Last Update: 2013-01-29 14:00:00 PST
[Back to date selection](#)

943 readings, displaying 11 - 20:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:00:00	24	24 °F	O	O	O
2012-12-19 10:00:00	24	24 °F	O	O	O
2012-12-19 11:00:00	24	24 °F	O	O	O
2012-12-19 12:00:00	23	23 °F	O	O	O
2012-12-19 13:00:00	24	24 °F	O	O	O
2012-12-19 14:00:00	24	24 °F	O	O	O
2012-12-19 16:00:00	26	26 °F	O	O	O
2012-12-19 17:00:00	27	27 °F	O	O	O
2012-12-19 18:00:00	31	31 °F	O	O	O
2012-12-19 19:00:00	34	34 °F	O	O	O

Navigation icons: |< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

Sacramento: Sacramento Interna Station

Latitude: 38.70139 Longitude: -121.59389
 Elevation: 26 ft Source: Mesowest
 Last Update: 2013-05-22 11:53:00 PDT
[Back to date selection](#)

9 readings, displaying 1 - 9:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:53:00	33.98	34 °F	O	O	O
2012-12-19 10:53:00	33.98	34 °F	O	O	O
2012-12-19 11:53:00	33.08	33 °F	O	O	O
2012-12-19 12:53:00	33.08	33 °F	O	O	O
2012-12-19 13:53:00	30.92	31 °F	O	O	O
2012-12-19 15:53:00	32	32 °F	O	O	O
2012-12-19 16:53:00	35.96	36 °F	O	O	O
2012-12-19 17:53:00	37.94	38 °F	O	O	O
2012-12-19 18:53:00	42.08	42 °F	O	O	O

Navigation icons: |< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

SACRAMENTO POST OFFICE Station

Latitude: 38.58333 Longitude: -121.50000
 Elevation: 7 ft Source: MADIS
 Last Update: 2013-05-22 07:29:00 PDT
[Back to date selection](#)

23 readings, displaying 1 - 10:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:15:00	275.372223	36 °F	O	O	O
2012-12-19 10:10:00	274.816681	35 °F	O	O	O
2012-12-19 11:05:00	274.261108	34 °F	O	O	O
2012-12-19 12:05:00	273.705566	33 °F	O	O	O
2012-12-19 14:15:00	273.705566	33 °F	O	O	O
2012-12-19 15:05:00	273.149994	32 °F	O	O	O
2012-12-19 16:15:00	274.261108	34 °F	O	O	O
2012-12-19 18:10:00	278.705566	42 °F	O	O	O
2012-12-19 18:20:00	279.261108	43 °F	O	O	O
2012-12-19 19:10:00	280.927765	46 °F	O	O	O

Navigation icons: |< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

General Pavement

Exposition Blvd.- Sac - 51N @ Tribute Station

Latitude: 38.59163 Longitude: -121.44535
 Elevation: 26 ft Source: Caltrans
 Last Update: 2013-05-22 12:00:43 PDT
[Back to date selection](#)

55 readings, displaying 1 - 10:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:00:31	0	32 °F	O	X	O
2012-12-19 09:10:24	0	32 °F	O	X	O
2012-12-19 09:31:43	0	32 °F	O	X	O
2012-12-19 09:41:09	0	32 °F	O	X	O
2012-12-19 10:11:22	0	32 °F	O	X	O
2012-12-19 10:31:36	0	32 °F	O	X	O
2012-12-19 10:41:22	0	32 °F	O	X	O
2012-12-19 11:01:53	0	32 °F	O	X	O
2012-12-19 11:11:24	0	32 °F	O	X	O
2012-12-19 11:30:40	0	32 °F	O	X	O

Navigation icons: |< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

Compare to Nearby Stations

GIBSON NEAR CASTELLA 10SSW Station

Latitude: 38.56556 Longitude: -121.48500
 Elevation: 1633 ft Source: Mesowest
 Last Update: 2013-01-29 14:00:00 PST
[Back to date selection](#)

943 readings, displaying 11 - 20:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:00:00	24	24 °F	O	O	O
2012-12-19 10:00:00	24	24 °F	O	O	O
2012-12-19 11:00:00	24	24 °F	O	O	O
2012-12-19 12:00:00	23	23 °F	O	O	O
2012-12-19 13:00:00	24	24 °F	O	O	O
2012-12-19 14:00:00	24	24 °F	O	O	O
2012-12-19 16:00:00	26	26 °F	O	O	O
2012-12-19 17:00:00	27	27 °F	O	O	O
2012-12-19 18:00:00	31	31 °F	O	O	O
2012-12-19 19:00:00	34	34 °F	O	O	O

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

SIMS Station

Latitude: 41.07500 Longitude: -122.37330
 Elevation: 2400 ft Source: Mesowest
 Last Update: 2013-05-22 11:33:00 PDT
[Back to date selection](#)

13 readings, displaying 1 - 10:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:32:00	26	26 °F	O	O	O
2012-12-19 10:32:00	25	25 °F	O	O	O
2012-12-19 11:32:00	25	25 °F	O	O	O
2012-12-19 12:32:00	25	25 °F	O	O	O
2012-12-19 13:32:00	24	24 °F	O	O	O
2012-12-19 15:32:00	24	24 °F	O	O	O
2012-12-19 16:32:00	25	25 °F	O	O	O
2012-12-19 17:32:00	28	28 °F	O	O	O
2012-12-19 18:32:00	32	32 °F	O	O	O
2012-12-19 19:32:00	34	34 °F	O	O	O

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

General Pavement

Dunsmuir Station

Latitude: 41.21752 Longitude: -122.27466
 Elevation: 2420 ft Source: Caltrans
 Last Update: 2013-05-22 12:07:49 PDT
[Back to date selection](#)

55 readings, displaying 1 - 10:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 09:07:45	-410	25 °F	O	O	O
2012-12-19 09:22:37	-440	24 °F	O	O	O
2012-12-19 09:37:37	-460	24 °F	O	O	O
2012-12-19 10:07:36	-460	24 °F	O	O	O
2012-12-19 10:22:45	-500	23 °F	O	O	O
2012-12-19 10:37:36	-510	23 °F	O	O	O
2012-12-19 10:52:37	-530	22 °F	O	O	O
2012-12-19 11:07:37	-540	22 °F	O	O	O
2012-12-19 11:22:36	-560	22 °F	O	O	O
2012-12-19 11:37:36	-560	22 °F	O	O	O

|< < > >|

General Pavement

Dunsmuir Station

Latitude: 41.21752 Longitude: -122.27466
 Elevation: 2420 ft Source: Caltrans
 Last Update: 2013-05-22 12:07:49 PDT
[Back to date selection](#)

55 readings, displaying 11 - 20:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 11:52:40	-560	22 °F	O	O	O
2012-12-19 12:07:45	-570	22 °F	O	O	O
2012-12-19 12:22:37	-600	21 °F	O	O	O
2012-12-19 12:37:36	-590	21 °F	O	O	O
2012-12-19 12:52:37	-580	22 °F	O	O	O
2012-12-19 13:07:36	-590	21 °F	O	O	O
2012-12-19 13:22:37	-610	21 °F	O	O	O
2012-12-19 13:37:45	-600	21 °F	O	O	O
2012-12-19 13:52:36	-610	21 °F	O	O	O
2012-12-19 14:07:45	-610	21 °F	O	O	O

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

General Pavement

Dunsmuir Station

Latitude: 41.21752 Longitude: -122.27466
 Elevation: 2420 ft Source: Caltrans
 Last Update: 2013-05-22 12:07:49 PDT
[Back to date selection](#)

55 readings, displaying 21 - 30:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 14:22:37	-610	21 °F	O	O	O
2012-12-19 14:37:37	-620	21 °F	O	O	O
2012-12-19 14:52:37	-610	21 °F	O	O	O
2012-12-19 15:07:37	-580	22 °F	O	O	O
2012-12-19 15:22:37	-580	22 °F	O	O	O
2012-12-19 15:37:45	-580	22 °F	O	O	O
2012-12-19 15:52:37	-560	22 °F	O	O	O
2012-12-19 16:07:37	-540	22 °F	O	O	O
2012-12-19 16:22:38	-520	23 °F	O	O	O
2012-12-19 16:37:37	-500	23 °F	O	O	O

|< < > >|

General Pavement

Dunsmuir Station

Latitude: 41.21752 Longitude: -122.27466
 Elevation: 2420 ft Source: Caltrans
 Last Update: 2013-05-22 12:07:49 PDT
[Back to date selection](#)

55 readings, displaying 31 - 40:

Date(UTC)	Raw Data	Data	QC1	QC2	QC3
2012-12-19 16:52:37	-480	23 °F	O	O	O
2012-12-19 17:07:40	-450	24 °F	O	O	O
2012-12-19 17:22:45	-410	25 °F	O	O	O
2012-12-19 17:37:38	-360	26 °F	O	O	O
2012-12-19 17:52:37	-300	27 °F	O	O	O
2012-12-19 18:07:45	-250	28 °F	O	O	O
2012-12-19 18:22:37	-210	28 °F	O	O	O
2012-12-19 18:37:38	-160	29 °F	O	O	O
2012-12-19 18:52:37	-120	30 °F	O	O	O
2012-12-19 19:07:45	-80	31 °F	O	O	O

|< < > >|

[Export to csv file](#)
[Back to the recent data](#)
[Report an error here](#)

WeatherShare “Level 3” QC

Regression Model:

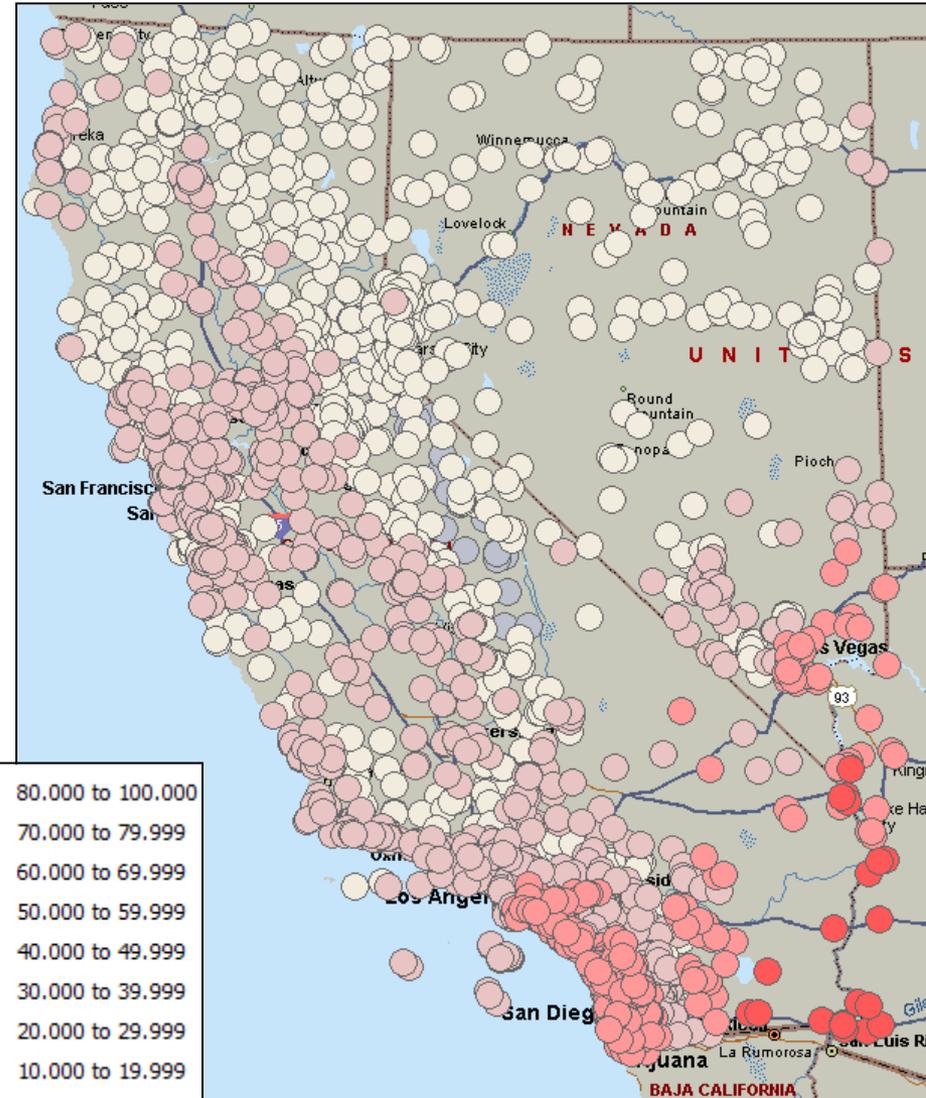
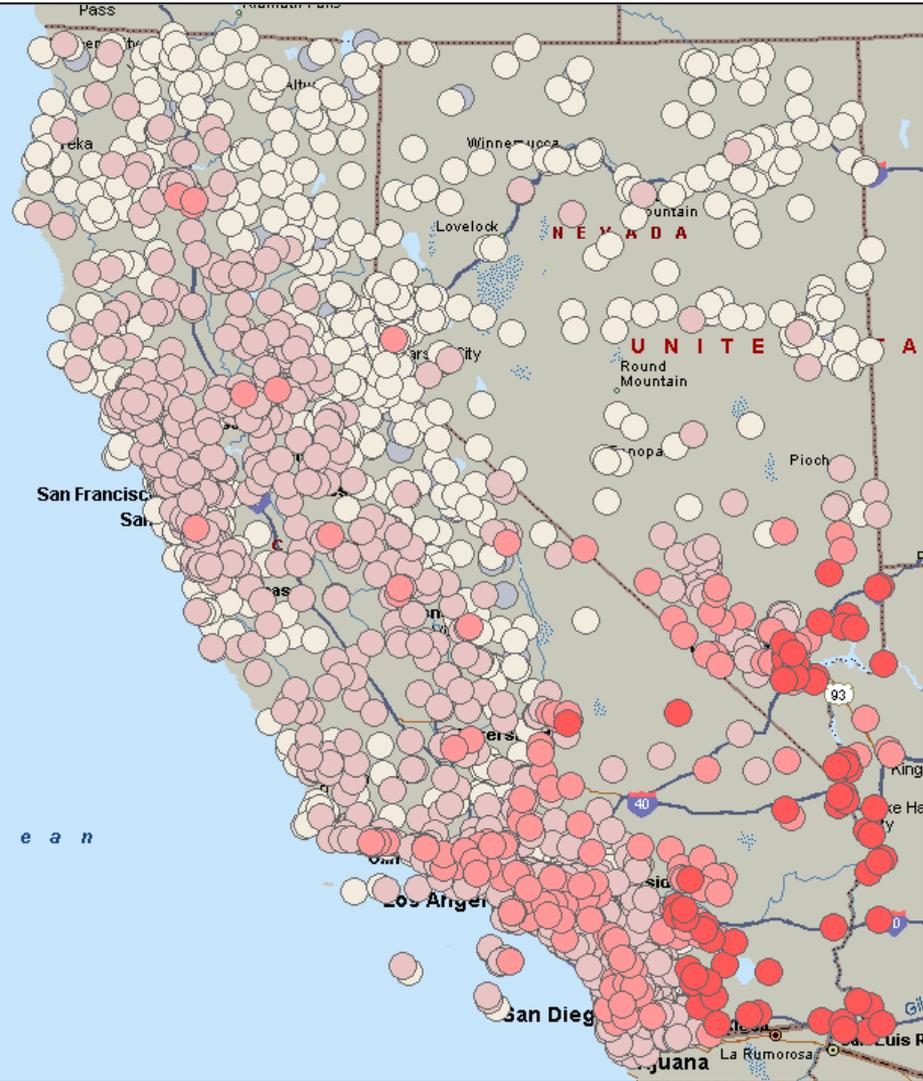
$$temp = c_1 + c_2 \cdot lat + c_2 \cdot lon + c_3 \cdot elev + c_4 \cdot lat \cdot lon$$

Algorithm:

- Run the regression model statewide.
- If a residual is > 35 flag the corresponding observation as bad.
- If a residual is > 17 but ≤ 35 , then run regression on the observation and its neighbors (within approx. 30 miles).
 - If the residual > 10 , flag the observation as bad.

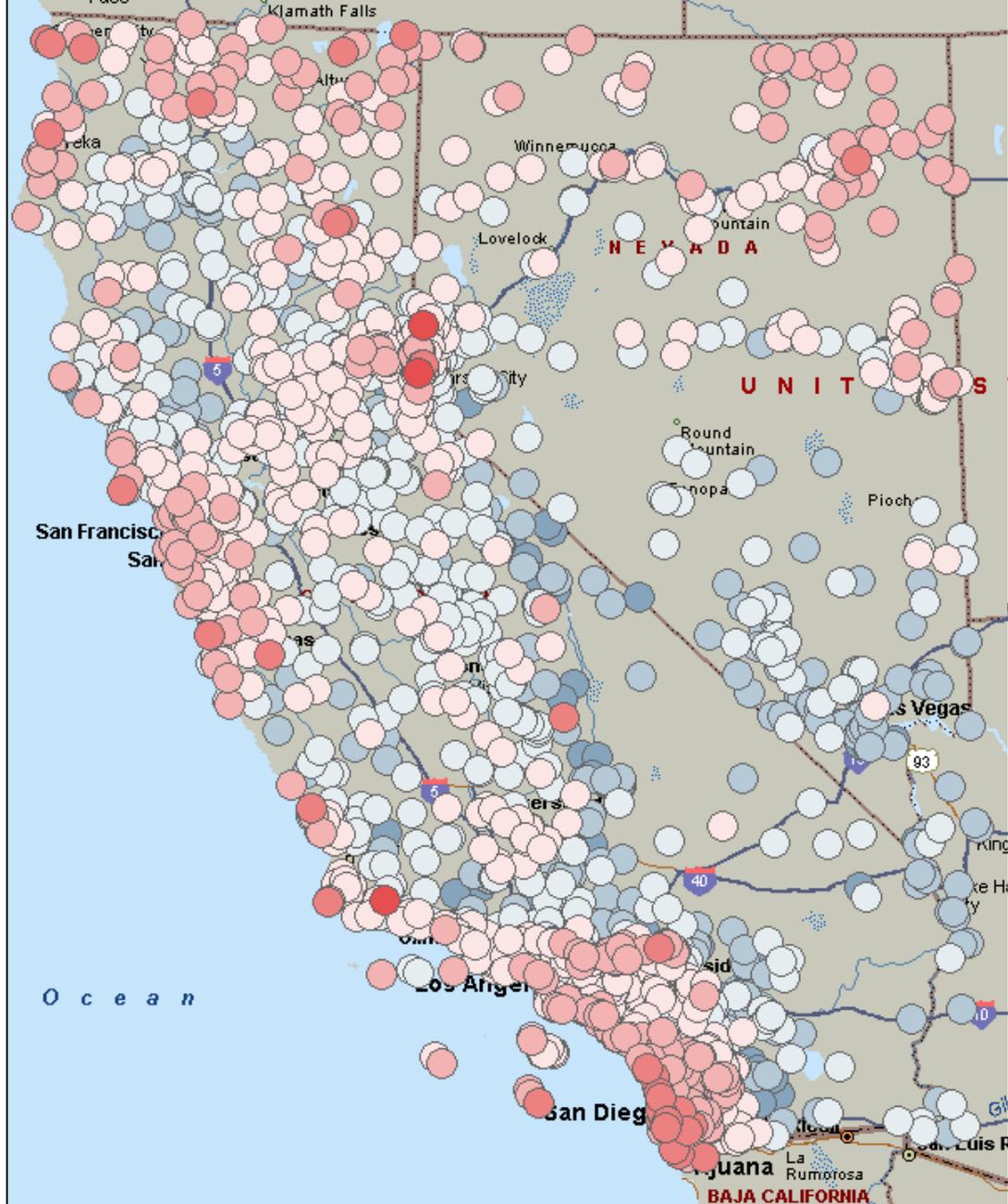
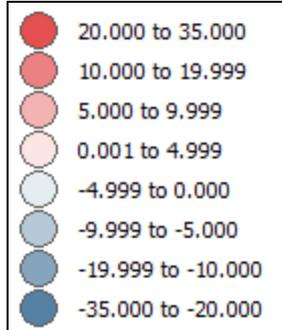
Actual

Predicted



$$temp = 1649.61 - 34.5852 \cdot lat + 13.3861 \cdot lon - 0.0033 \cdot elev - 0.2934 \cdot lat \cdot lon$$

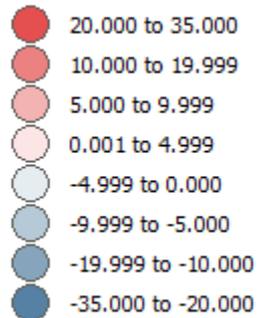
Residuals



Actual



Residuals from Whole State Model



Residuals for 30 mi Neighborhood Regression



$$temp = -68034.1583 + 2005.0471 \cdot lat - 568.3597 \cdot lon - 0.0030 \cdot elev + 16.7335 \cdot lat \cdot lon$$

RWIS Station Report

[Show All Stations](#)

14 sensor(s), displaying 1 - 14

QC 1: ■ QC 2: ■ QC 3: ■

ID	Name	Lat	Lon	Elevation	District	County	Last Updated (UTC)	Sensor Name	Sensor Code	Sensor Value	QC Detail
303002	I-15 Windy Point	34.26099	-117.43651	3381	8	San Bernardino	2012-11-24 16:30:34	Temperature	AirTemp	64	Link
303000	I-15 Duncan Rd	34.17951	-117.45789	2486	8	San Bernardino	2011-05-25 08:15:01	Temperature	AirTemp	54	Link
259006	I-10 Jefferson St.	33.75746	-116.28414	73	8	Riverside	2011-12-19 21:16:30	Temperature	AirTemp	112	Link
164004	Rt 58 Broome Rd	35.24044	-118.59432	2639	6	Kern	0000-00-00 00:00:00	Temperature	AirTemp	80	Link
164005	RT 58 Tehachapi Summit	35.18326	-118.43855	4996	6	Kern	0000-00-00 00:00:00	Temperature	AirTemp	89	Link
509005	Brockway Summit	39.25514	-120.05591	6718	3	Placer	2012-06-18 22:46:07	Temperature	AirTemp	69	Link
I-80BryteBend	I-80 Bryte Bend	38.60300	-121.54481	18	3	Sacramento	2007-04-10 21:21:38	Temperature	essAirTemperature.1	74	Link
509013	Exposition Blvd.- Sac - 51N @ Tribute	38.59163	-121.44535	26	3	Sacramento	2013-05-23 21:10:34	Temperature	AirTemp	32	Link
509008	I-80 Donner Pass-Weigh Stn	39.36222	-120.13010	5828	3	Nevada	2013-05-23 21:18:06	Temperature	AirTemp	32	Link
Richards	Richards	38.59847	-121.50440	49	3	Sacramento	2007-04-25 12:47:30	Temperature	essAirTemperature.1	212	Link
Floriston	Floriston	39.39559	-120.02387	5301	3	Nevada	2007-11-11 01:39:02	Temperature	essAirTemperature.1	212	Link
537002	North Weed Cut	41.42952	-122.40325	3454	2	Siskiyou	2012-05-14 20:03:59	Temperature	AirTemp	75	Link
547001	South Cushing Creek	41.70306	-124.12365	1045	1	Del Norte	2012-12-27 21:58:59	Dew Point	Dewpoint	98	Link
547001	South Cushing Creek	41.70306	-124.12365	1045	1	Del Norte	2012-12-27 21:58:59	Temperature	AirTemp	103	Link

[Download CSV](#)
[Logout](#)

Quality Control Detail

Exposition Blvd.- Sac - 51N @ Tribute : Temperature Sensor : **32 °F**

Latitude: 38.59163 Longitude: -121.44535 Elevation: 26
 Source: CALTRANS Last Update (UTC): 2013-05-23 21:30:46 Map Display: [Link](#)

QC Summary

QC Level	Description	Valid At	Pass/Fail
1	Range Check	-60 : 130 °F	Pass
2	Temporal Consistency	> 20°F/hour or no change in 24 hours	Fail
3	Spatial Consistency	(Predicted value - Actual value) < 10	N/A

Past Sensor Readings (6hr)

Timestamp (UTC)	Reading	Raw Data	QC
2013-05-23 21:30:46	32	0	Failed - 2
2013-05-23 21:10:34	32	0	Failed - 2
2013-05-23 21:00:38	32	0	Failed - 2
2013-05-23 20:40:50	32	0	Failed - 2
2013-05-23 20:30:37	32	0	Failed - 2
2013-05-23 20:10:27	32	0	Failed - 2
2013-05-23 20:00:50	32	0	Failed - 2
2013-05-23 19:40:37	32	0	Failed - 2
2013-05-23 19:30:45	32	0	Failed - 2
2013-05-23 19:10:40	32	0	Failed - 2
2013-05-23 19:00:35	32	0	Failed - 2
2013-05-23 18:40:26	32	0	Failed - 2
2013-05-23 18:30:35	32	0	Failed - 2
2013-05-23 18:10:25	32	0	Failed - 2
2013-05-23 18:01:09	32	0	Failed - 2
2013-05-23 17:41:01	32	0	Failed - 2
2013-05-23 17:30:43	32	0	Failed - 2
2013-05-23 17:10:58	32	0	Failed - 2
2013-05-23 17:00:46	32	0	Failed - 2
2013-05-23 16:40:32	32	0	Failed - 2
2013-05-23 16:30:36	32	0	Failed - 2
2013-05-23 16:10:33	32	0	Failed - 2
2013-05-23 16:00:50	32	0	Failed - 2
2013-05-23 15:40:40	32	0	Failed - 2
2013-05-23 15:31:03	32	0	Failed - 2

Nearby Reporting Stations (15mi)

Station Name	Elevation	Reading	Updated (UTC)	Source	Distance From (mi)	QC						
SACRAMENTO POST OFFICE	26	72	2013-05-23 21:36:00	Meso								
N6OIM Fair Oaks	20	73	2013-05-23 21:34:00	MADI	Sacramento: Sacramento Mather	95	68	2013-05-23 20:45:00	Mesowest	8.4	Passed	
KG6TQ Sacramento	5	71	2013-05-23 21:33:00	MADI	MATHER AFB	9	68	2013-05-23 20:45:00	MADIS	8.4	Passed	
Richards Bl Sac-5-24.8 s/o Amer Rv	20	72	2013-05-23 21:31:29	CALTR	Bombay	30	71	2013-05-23 20:30:00	Mesowest	8.8	Passed	
Airport Yol-5-0.4 w/o Sac Rvr	20	72	2013-05-23 21:30:56	CALTR	Sacramento-Del Paso Manor	125	66	2013-05-23 20:00:00	Mesowest	4.4	Passed	
I-80 Yolo CauseWy - East	20	71	2013-05-23 21:30:13	CALTR	Bryte	39	57	2013-05-23 17:00:00	Mesowest	5.1	Passed	
CW0443 Sacramento	46	72	2013-05-23 21:30:00	MADI	Bombay	9	50	2013-05-23 09:00:00	MADIS	8.8	Passed	
N6OIM Fair Oaks	217	73	2013-05-23 21:29:00	Meso	SACRAMENTO POST OFFICE	7	54	2013-05-22 14:29:00	MADIS	3	Passed	
KJ6MC Elk Grove	49	0	2013-05-23 21:28:00	Meso	SOCARBUS2	13	68	2013-02-14 20:53:00	Mesowest	4.5	Passed	
KJ6MC Elk Grove	49	0	2013-05-23 21:28:00	MADI	SOCARBCV1	13	87	2012-06-14 20:00:00	Mesowest	3	Failed - 3	
CW0443 Sacramento	46	72	2013-05-23 21:26:00	Meso	CW0458 Rancho Cordova	72	101	2011-10-09 01:10:00	Mesowest	7	Failed - 2	
CW3183 Elk Grove	33	73	2013-05-23 21:25:00	Meso	CW0458 Rancho Cordova	23	101	2011-10-09 01:09:00	MADIS	7	Failed - 2	
CW3183 Elk Grove	10	73	2013-05-23 21:25:00	MADI	Sacramento-Health Dept	26	55	2011-03-01 20:00:00	Mesowest	2.5	Passed	
Sacramento: McClellan Airfield	72	70	2013-05-23 21:20:00	Meso	CW6253 Sacramento	25	79	2010-08-09 19:42:00	MADIS	3.5	Failed - 3	
KG6TQ Sacramento	49	71	2013-05-23 21:19:00	Meso	CW6253 Sacramento	25	88	2010-08-07 22:03:00	Mesowest	3.5	Failed - 3	
BRANCH CENTER	75	73	2013-05-23 21:10:00	Meso	CW9951 Roseville	153	102	2009-08-10 23:57:00	Mesowest	15.1	Failed - 3	
SACRAMENTO METRO AIRPORT	20	71	2013-05-23 21:10:00	Meso	CW6887 West Sacramento	16	53	2008-11-26 16:32:00	Mesowest	4.4	Passed	
SACRAMENTO METRO AIRPORT	6	71	2013-05-23 21:10:00	MADI	CW6887 West Sacramento	16	53	2008-11-26 16:31:00	MADIS	4.4	Passed	
BRANCH CENTER	22	73	2013-05-23 21:10:00	MADI	CW9951 Roseville	14	44	2008-11-23 07:19:00	MADIS	15.1	Passed	
GIBSON NEAR CASTELLA 10SSW	1633	74	2013-05-23 21:00:00	Meso	CW5497 Rancho Cordova	66	94	2008-07-19 19:17:00	Mesowest	8.5	Failed - 3	
Sacramento: Sacramento Executi	20	71	2013-05-23 20:53:00	Meso	CW4719 Elk Grove	23	68	2008-07-19 05:17:00	Mesowest	11.6	Passed	
Sacramento: Sacramento Interna	26	71	2013-05-23 20:53:00	Meso	CW4719 Elk Grove	8	68	2008-07-19 05:17:00	MADIS	11.6	Passed	
SOCARBCV1	43	71	2013-05-23 20:53:00	Meso	CW7562 Sacramento	6	57	2008-05-27 16:04:00	MADIS	9.9	Passed	
SOCARBCV2	26	67	2013-05-23 20:53:00	Meso	I-80 Expo	51	61	2007-07-12 07:01:27	CALTRANS	0	Passed	
SOCARBUS1	13	67	2013-05-23 20:53:00	Meso	I-80 Yolo East	12	55	2007-04-25 15:06:03	CALTRANS	8	Passed	
SACRAMENTO/EXECU	2	71	2013-05-23 20:53:00	MADI	I-80 Pioneer	31	56	2007-04-25 15:04:05	CALTRANS	4.6	Passed	
SACRAMENTO METRO	2	71	2013-05-23 20:53:00	MADI	Richards	49	212	2007-04-25 12:47:30	CALTRANS	3.2	Failed - 3	
					I-80 Bryte Bend	18	74	2007-04-10 21:21:38	CALTRANS	5.4	Failed - 3	
					Rampart	51	43	2006-11-14 04:57:20	CALTRANS	0	Passed	
					I-80 Yolo CauseWy - West	16	59	0000-00-00 00:00:00	CALTRANS	10.6	Passed	

Can we Identify Outlier CCTV Images Using File Sizes?

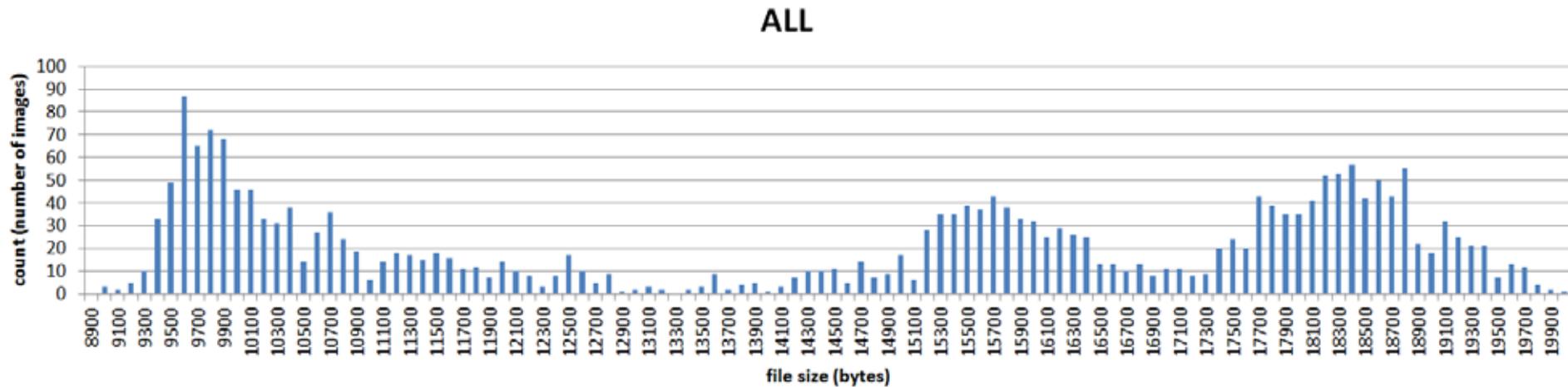
Can we apply some simple outlier detection procedures?

If a data element from a set falls more than 2 (or 3) standard deviations from the mean, then label it as an outlier.

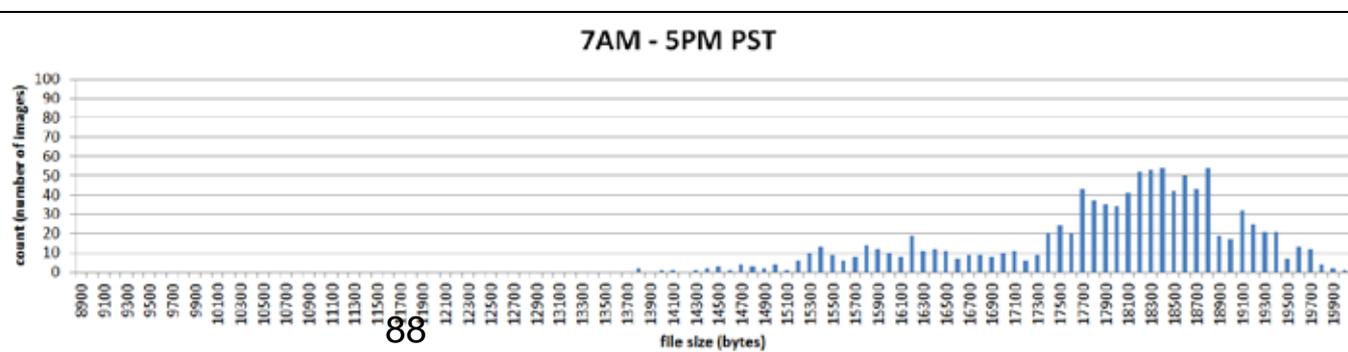
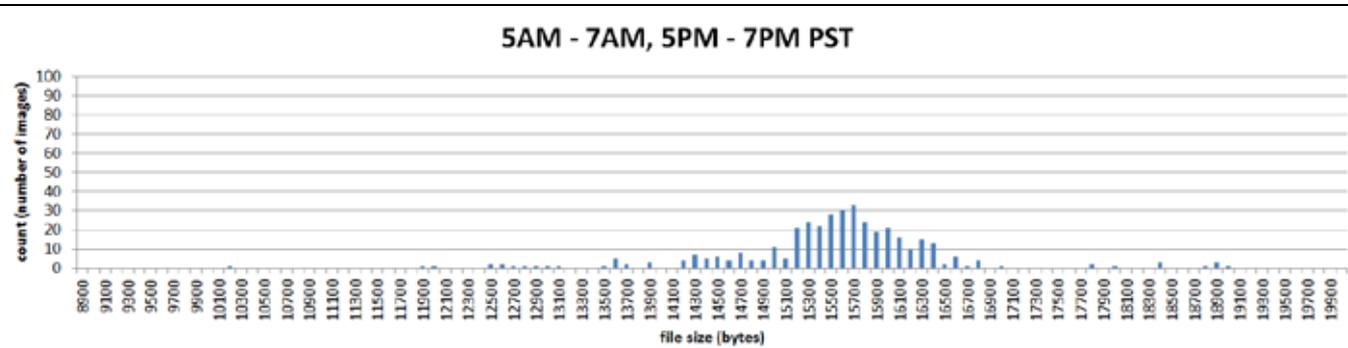
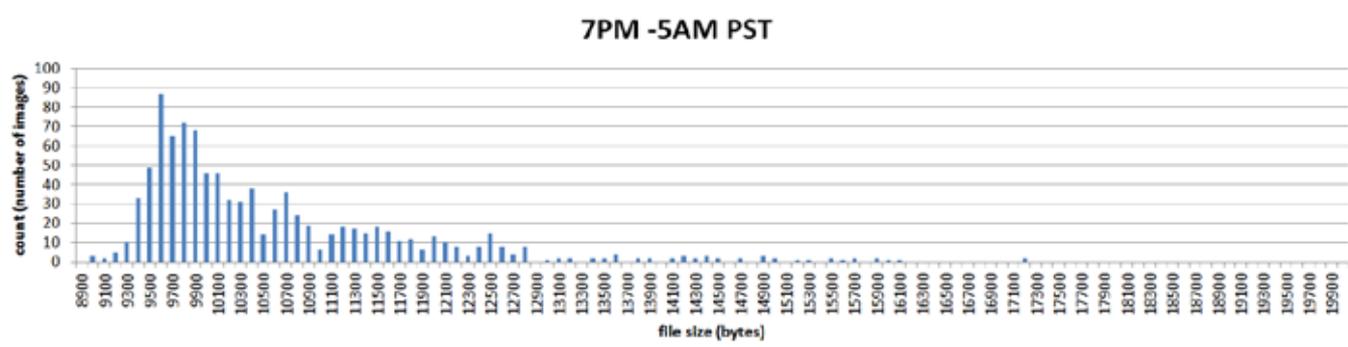
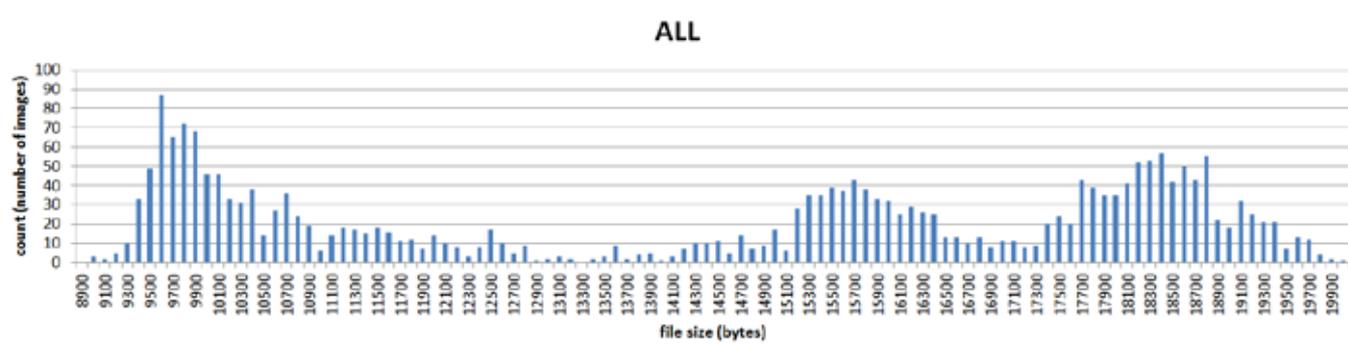
or

If a data element falls $1.5 \times \text{IQR}$ (interquartile range = $Q_3 - Q_1$) below Q_1 (the first quartile) or above Q_3 (the third quartile), then label it as an outlier.

File sizes for Caltrans D2 Dunsmuir images from a portion of April, 2013:



File sizes for Caltrans D2 Dunsmuir images from a portion of April 2013:



Statistics for File sizes for Caltrans D2 Dunsmuir images from a portion of April 2013:

ALL		Nighttime		Twilight		Daytime	
<i>mean</i>	14474.32	<i>mean</i>	10548.55	<i>mean</i>	15465.48	<i>mean</i>	17824.33
<i>standard deviation</i>	3563.92	<i>standard deviation</i>	1268.51	<i>standard deviation</i>	980.65	<i>standard deviation</i>	1190.40
<i>min</i>	8909.00	<i>min</i>	8909.00	<i>min</i>	10126.00	<i>min</i>	13712.00
<i>Q1</i>	10421.50	<i>Q1</i>	9675.50	<i>Q1</i>	15147.75	<i>Q1</i>	17372.00
<i>median</i>	15467.00	<i>median</i>	10087.00	<i>median</i>	15558.00	<i>median</i>	18127.00
<i>Q3</i>	17940.50	<i>Q3</i>	11049.50	<i>Q3</i>	15912.75	<i>Q3</i>	18622.00
<i>max</i>	19903.00	<i>max</i>	17175.00	<i>max</i>	18984.00	<i>max</i>	19903.00
<i>IQR</i>	7519.00	<i>IQR</i>	1374.00	<i>IQR</i>	765.00	<i>IQR</i>	1250.00
<i>mean - 2*sd</i>	7346.48	<i>mean - 2*sd</i>	8011.54	<i>mean - 2*sd</i>	13504.18	<i>mean - 2*sd</i>	15443.54
<i>mean + 2*sd</i>	21602.15	<i>mean + 2*sd</i>	13085.57	<i>mean + 2*sd</i>	17426.77	<i>mean + 2*sd</i>	20205.13
<i>mean - 3*sd</i>	3782.57	<i>mean - 3*sd</i>	6743.04	<i>mean - 3*sd</i>	12523.54	<i>mean - 3*sd</i>	14253.14
<i>mean+3*sd</i>	25166.07	<i>mean+3*sd</i>	14354.07	<i>mean+3*sd</i>	18407.42	<i>mean+3*sd</i>	21395.53
<i>Q1 - 1.5 * iqr</i>	-857.00	<i>Q1 - 1.5 * iqr</i>	7614.50	<i>Q1 - 1.5 * iqr</i>	14000.25	<i>Q1 - 1.5 * iqr</i>	15497.00
<i>Q3 + 1.5 * iqr</i>	29219.00	<i>Q3 + 1.5 * iqr</i>	13110.50	<i>Q3 + 1.5 * iqr</i>	17060.25	<i>Q3 + 1.5 * iqr</i>	20497.00

20130424105116 (9,610 bytes)



20130407130617 (10,126 bytes)



20130420080618 (12,396 bytes)



20130415073616 (8909 bytes)



20130412075116 (11,345 bytes)



20130406183617 (13,712 bytes)



20130411145117 (16,508 bytes)



20130418135117 (15,703 bytes)



201304115162118 (18,401 bytes)



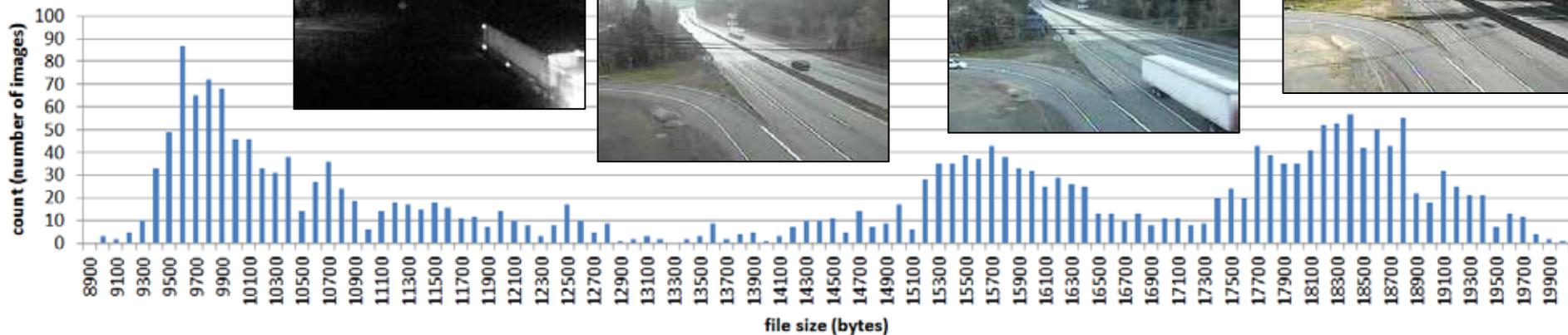
20130411030619 (17,175 bytes)



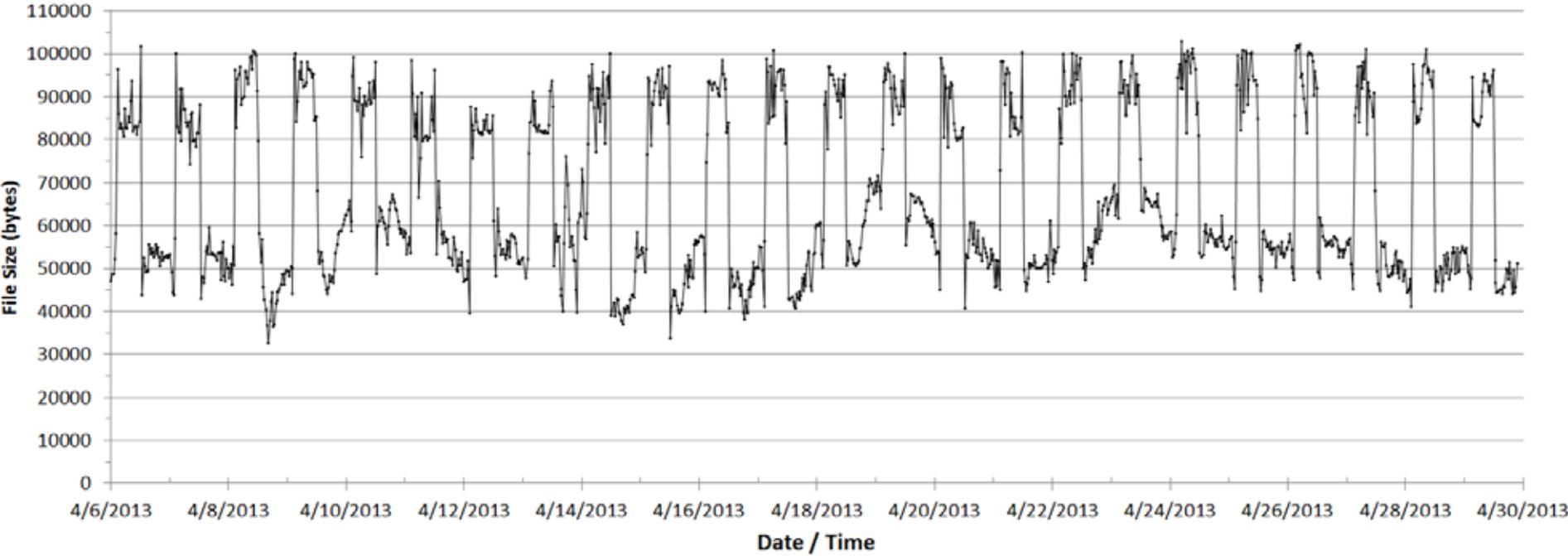
20130422145122 (18,984 bytes)



20130423153619 (19,903 bytes)



Files sizes for Montana Bozeman Pass in April, 2013:



2013-04-24-04-44 102,866 bytes



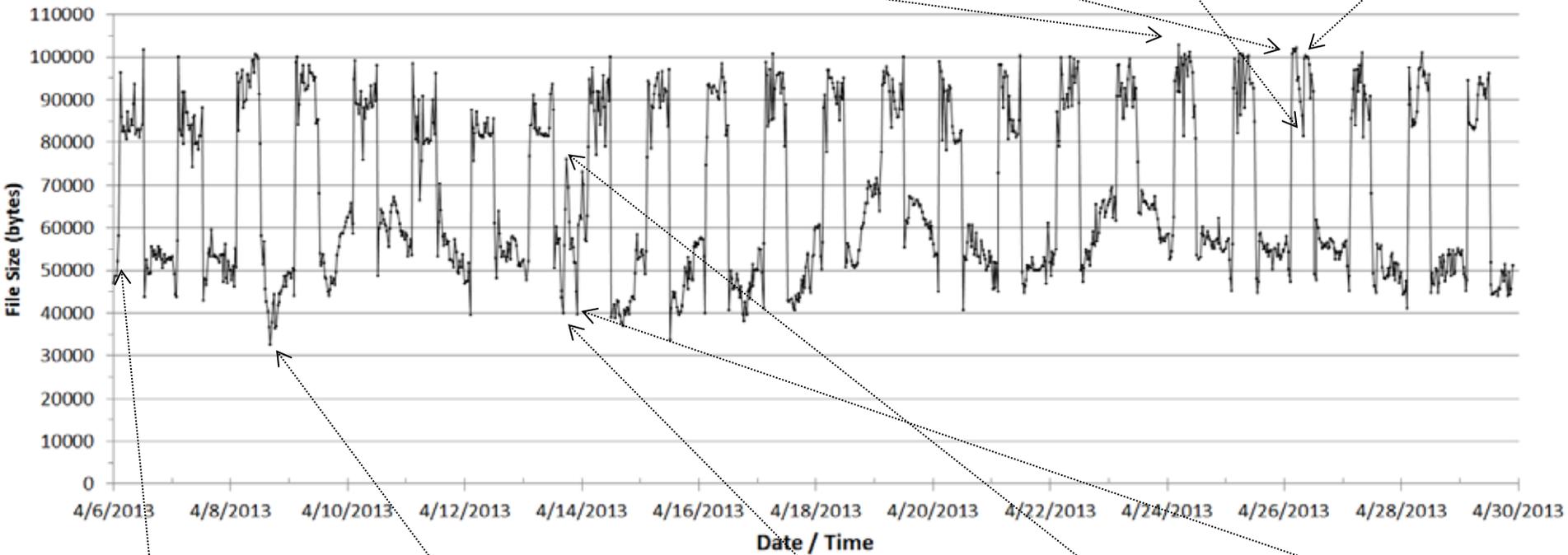
2013-04-26-04-45 102,285 bytes



2013-04-26-07-45 81,363 bytes



2013-04-26-08-44 100,317 bytes



2013-04-06-16-45 54,706 bytes



2013-04-08-16-15 32,688 bytes



2013-04-13-16-15 40,025 bytes



2013-04-13-17-45 76,258 bytes



2013-04-13-22-16 39,769 bytes



2013-04-24-04-44 102,866 bytes

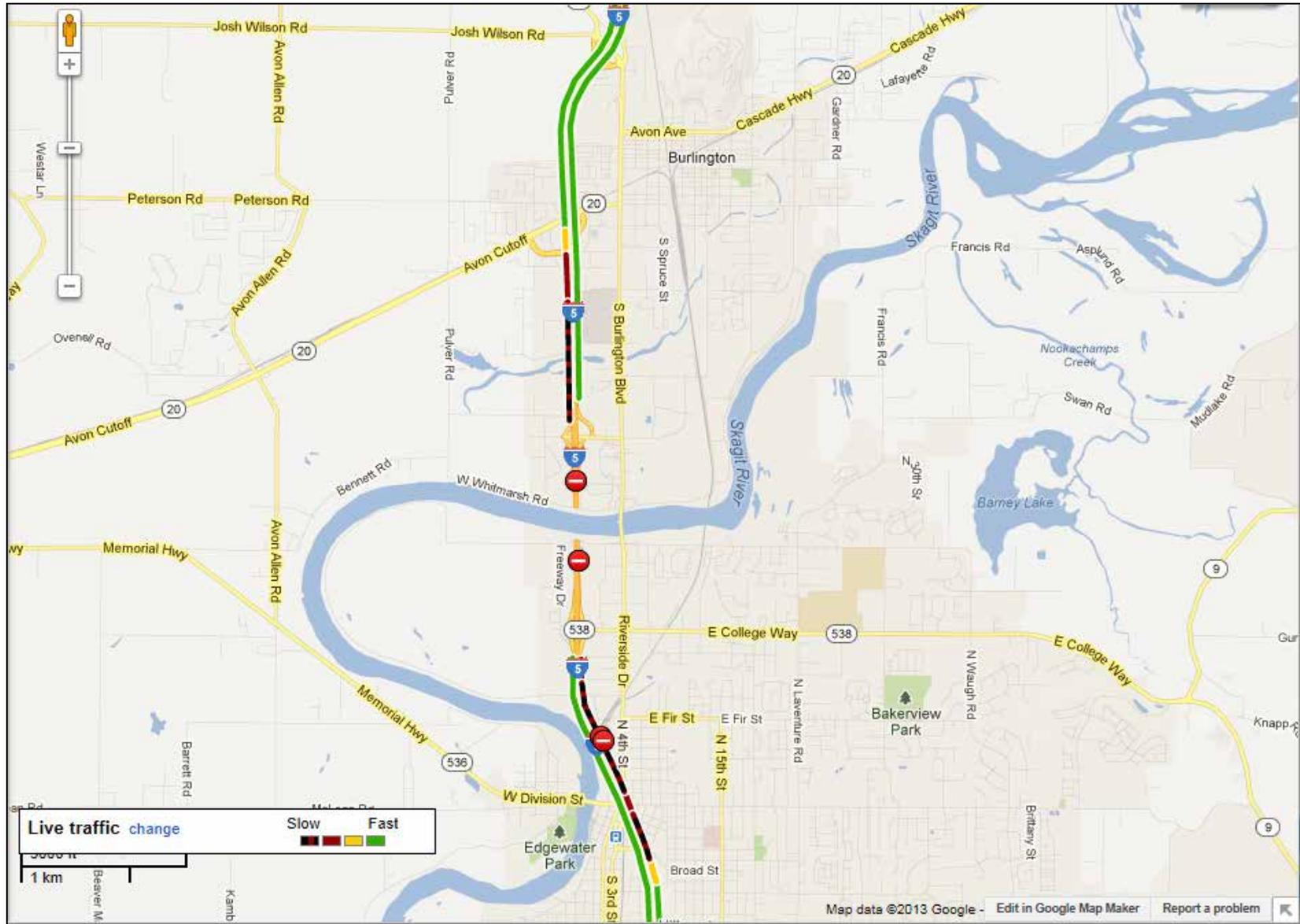


What challenges might occur with this approach for an image like the following?

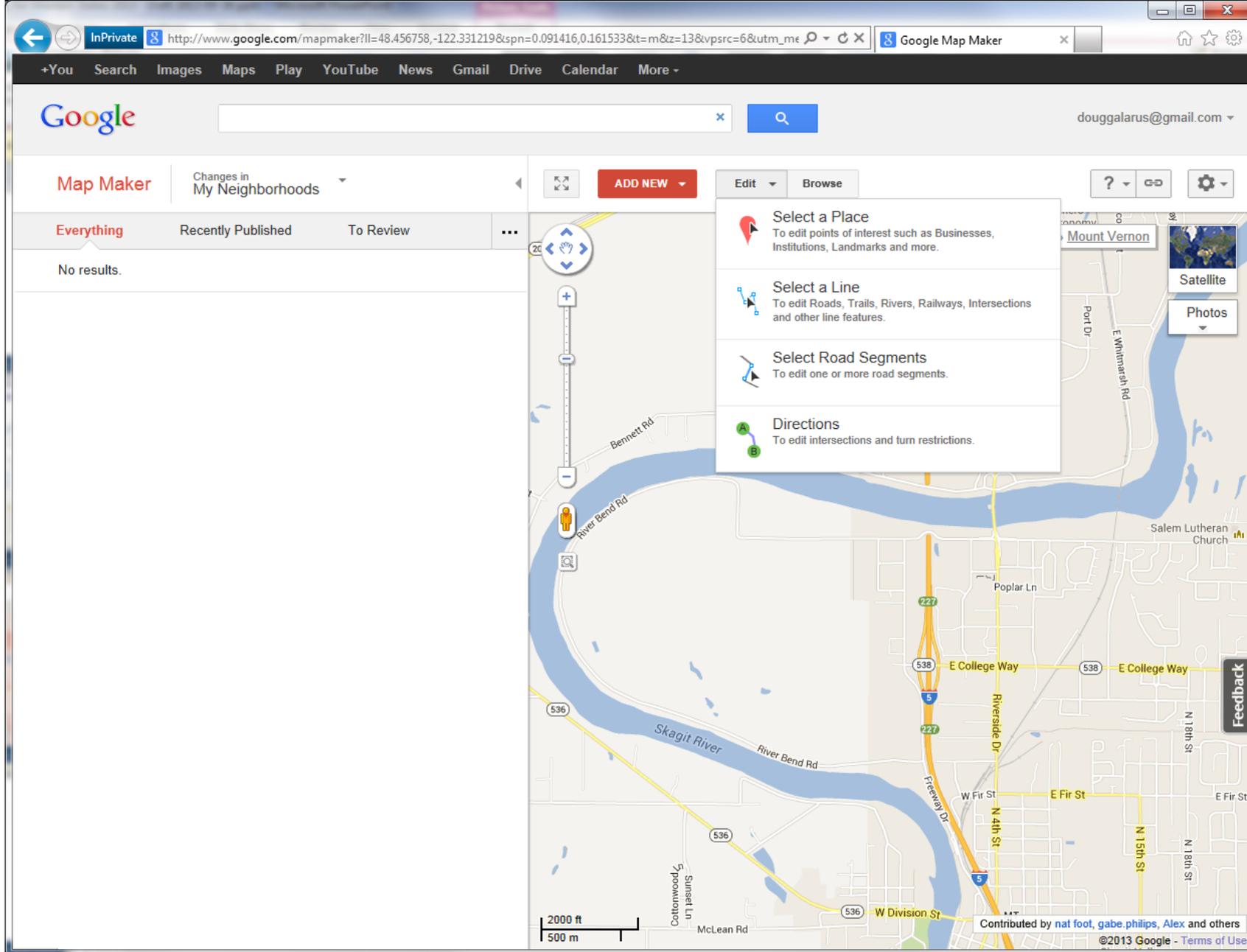


One last item from “what others are doing” ...

Google Maps



Google Map Maker

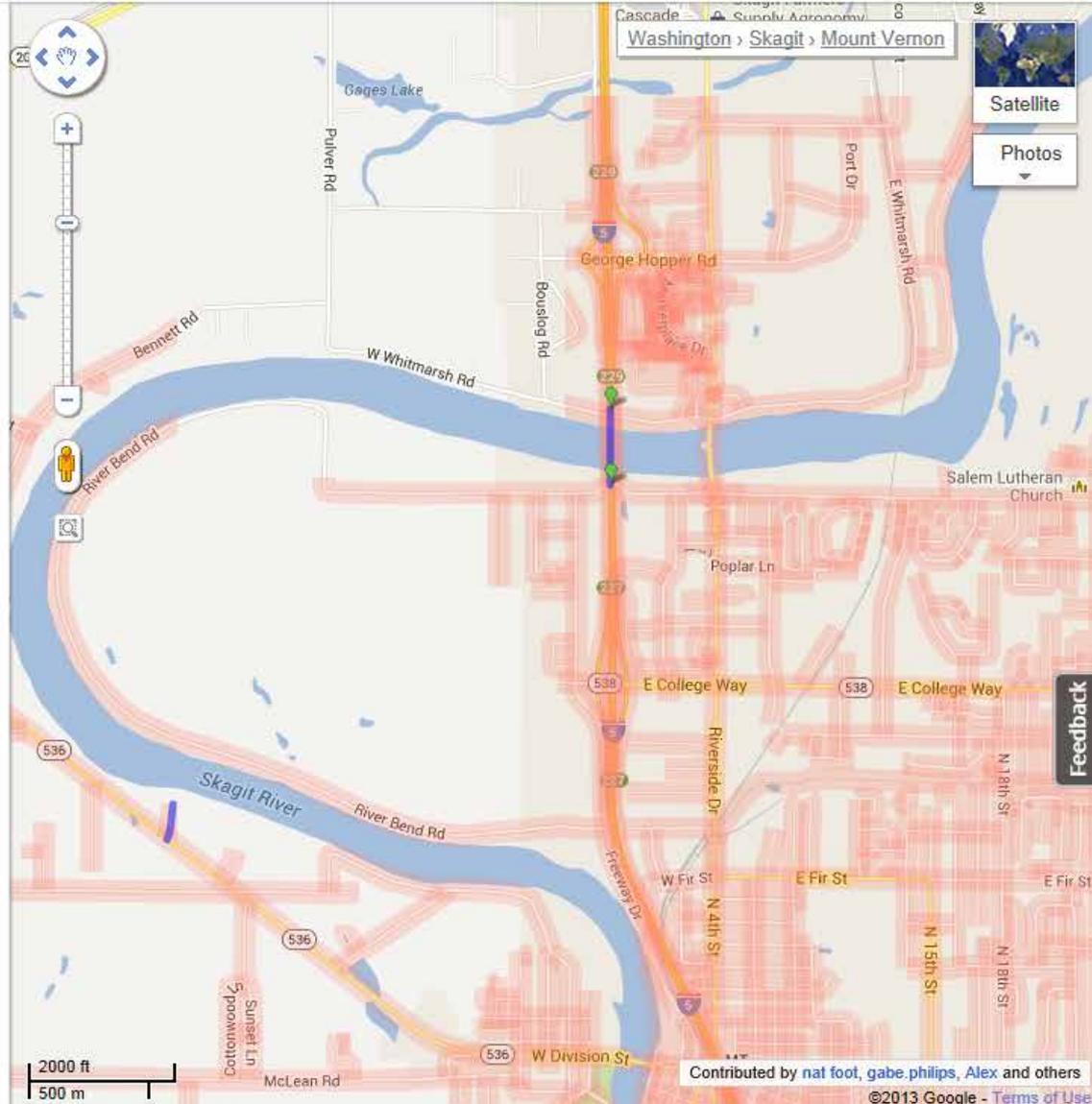


Select a set of segments

1. Click on segments to select or de-select for editing.
2. Drag the green markers to extend selection.

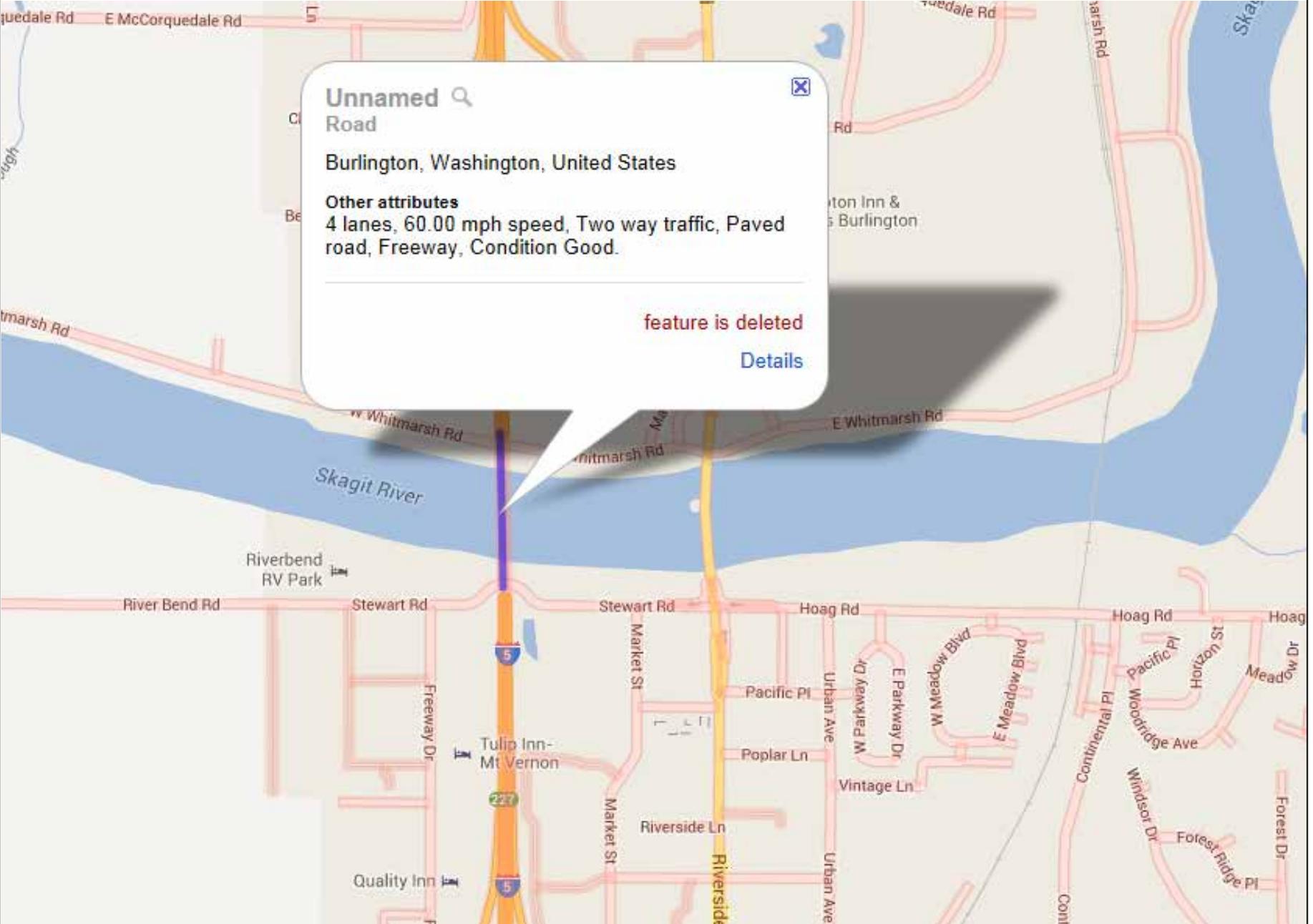
Clear selection

Next

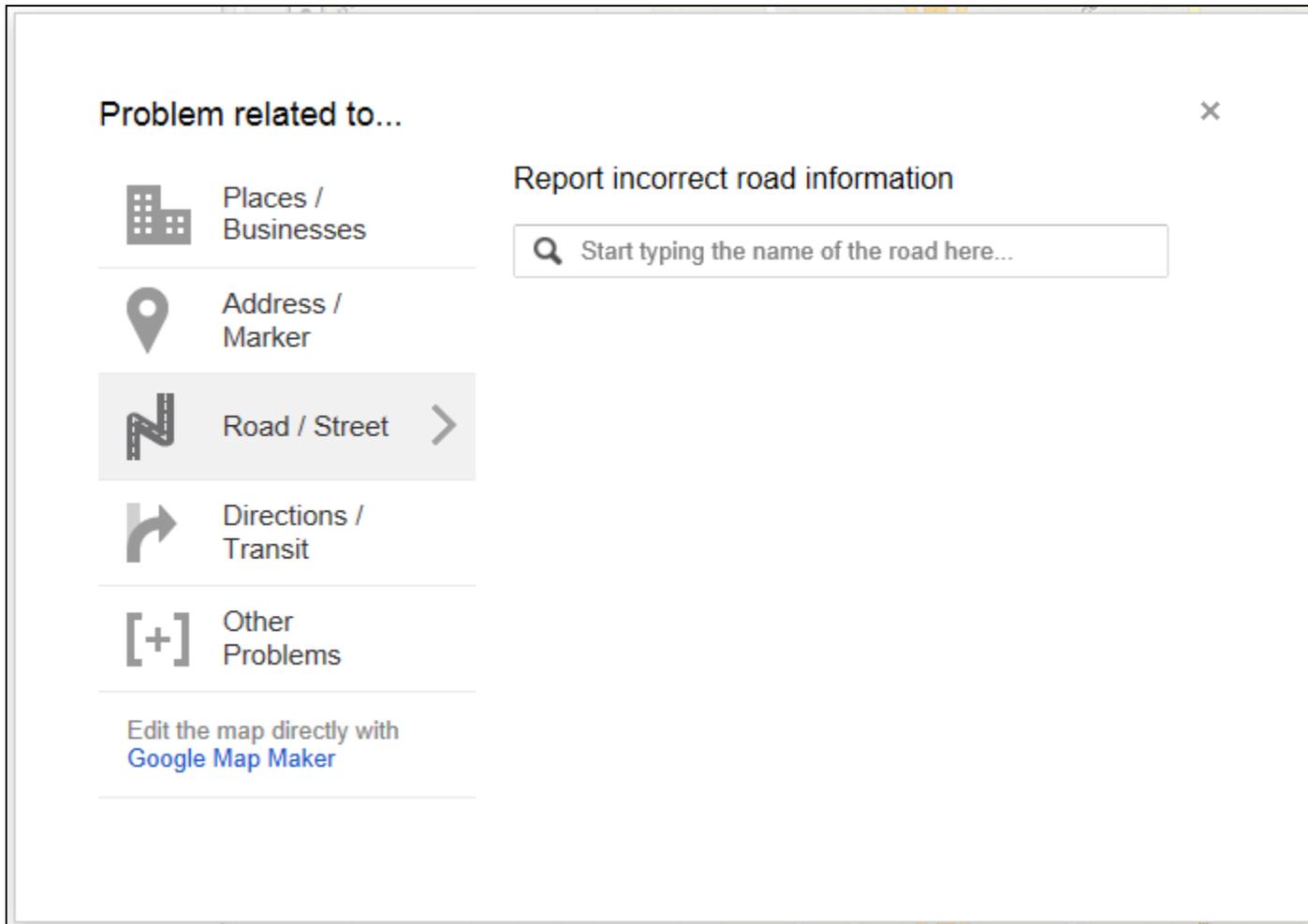


Contributed by nat foot, gabe.philips, Alex and others

©2013 Google - Terms of Use



Google Maps “Report a Problem”



WeatherShare and Western States OSS

Try them out:

<http://oss.weathershare.org/>

<http://www.weathershare.org/>

For further information:

<http://www.westernstates.org/Projects/OSS/>

<http://www.westernstates.org/Projects/WeatherShare/>

Questions?