Observing Dust

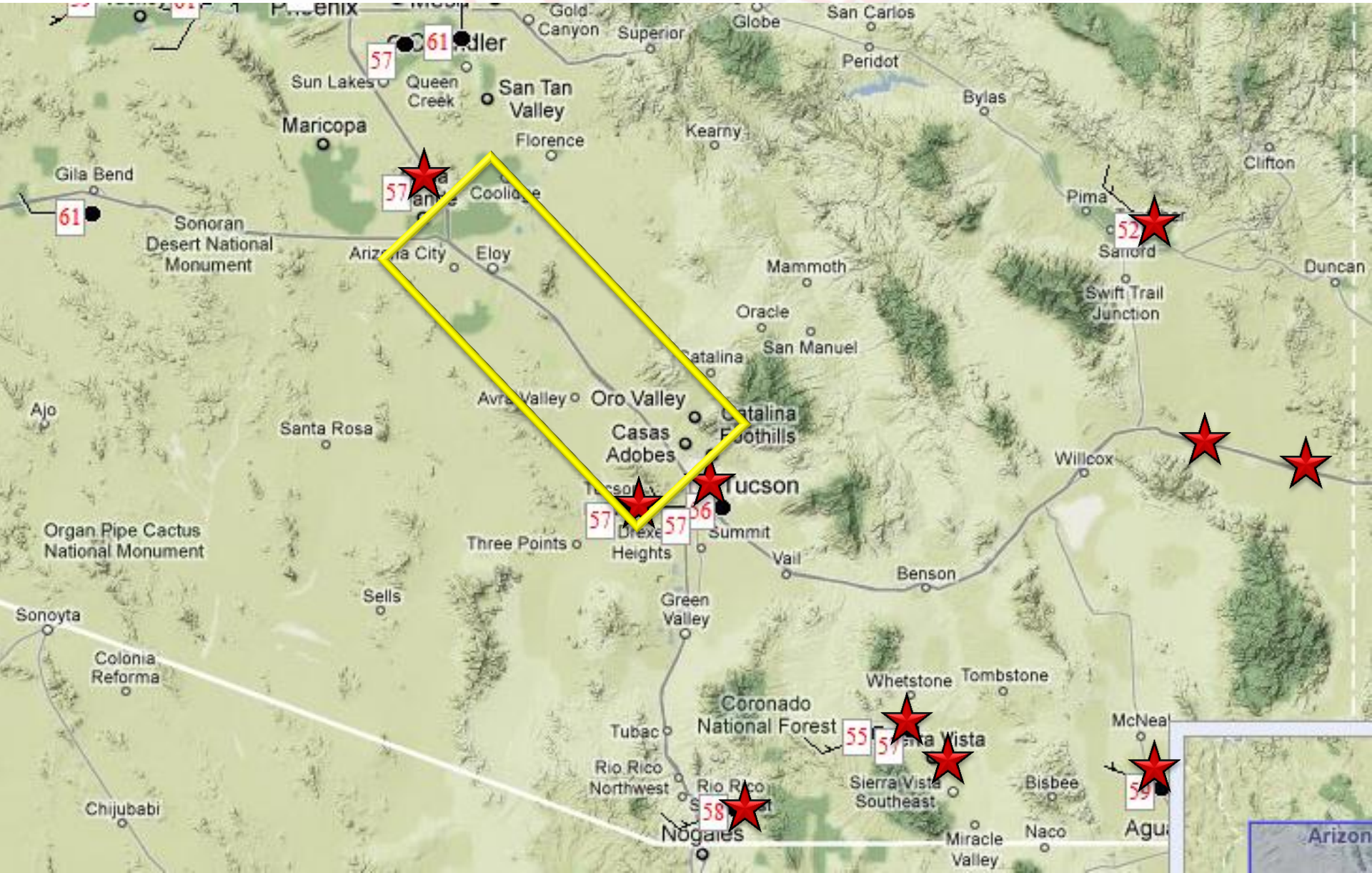
How the NWS Observes, Predicts and Warns for Dust Events

John J. Brost
Science and Operations Officer
NWS Tucson, AZ

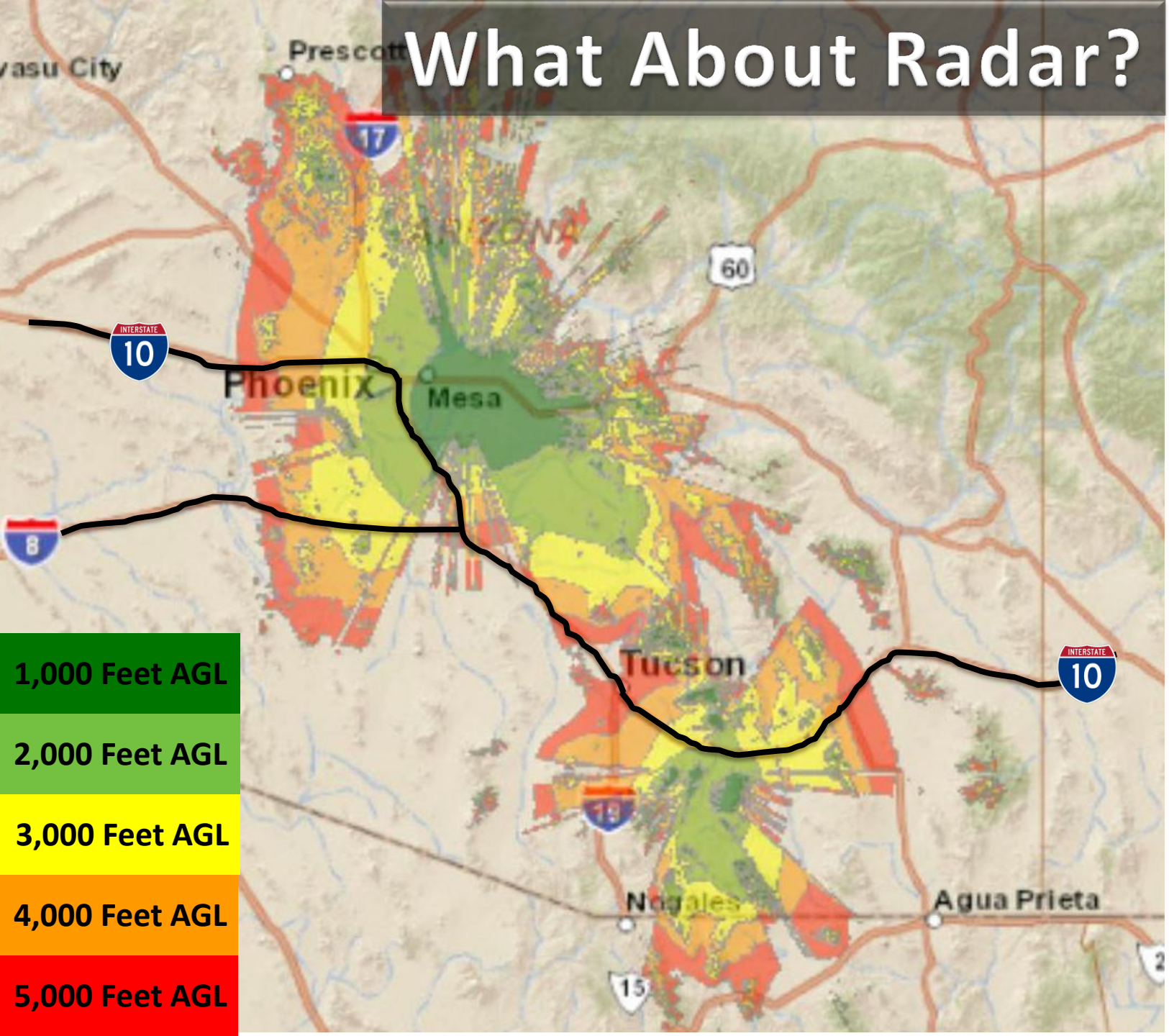
Discussion Topics

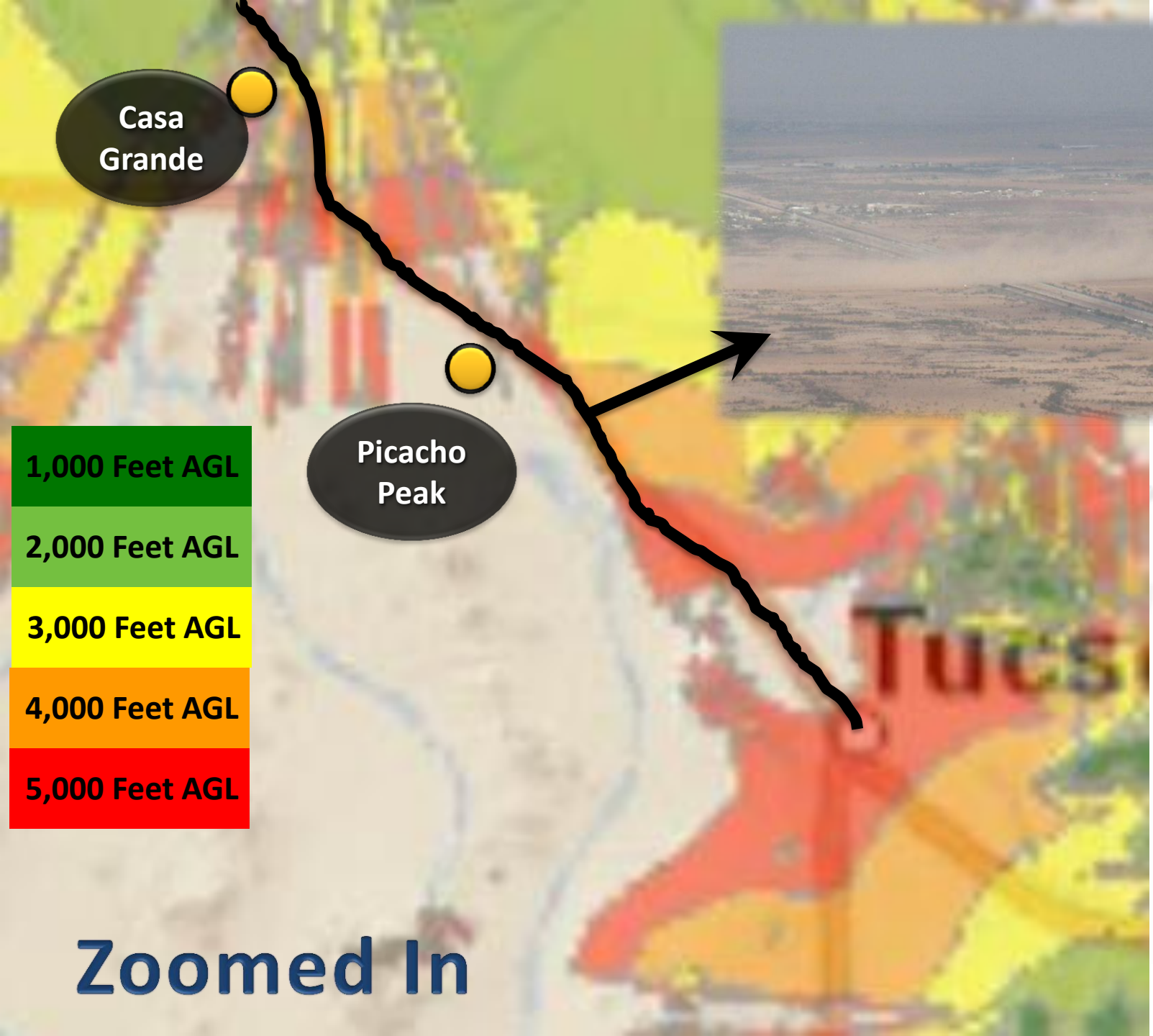
- How do we observe dust today?
- How can we improve dust detection?
- What are our limitations?
- How do we warn for dust?
- How can we improve warning strategies?

Dust Detection



What About Radar?




Casa Grande
Picacho Peak
1,000 Feet AGL
2,000 Feet AGL
3,000 Feet AGL
4,000 Feet AGL
5,000 Feet AGL
~100 Feet
Zoomed In

How Do We Detect Dust?

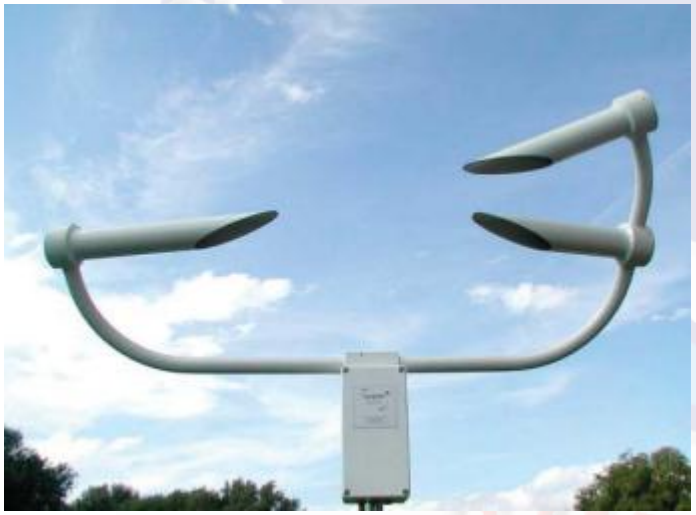
- **Media**
  - **3 T.V.'s in operations serve as "Situational Awareness"**
  - **Usually an accident on I-10 triggers media coverage**
- **Spotters or Public reports**
  - **"It's really dusty here"**
- **DPS**
  - **"When will the dust end – we are working an accident on I-10"**

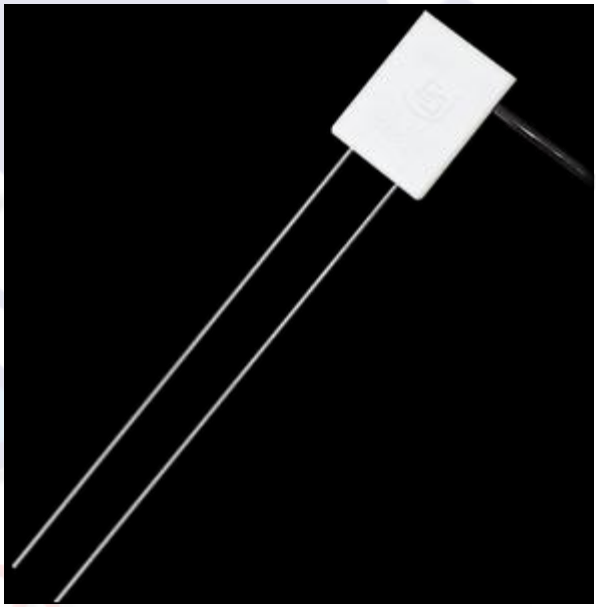
Ways To Improve?

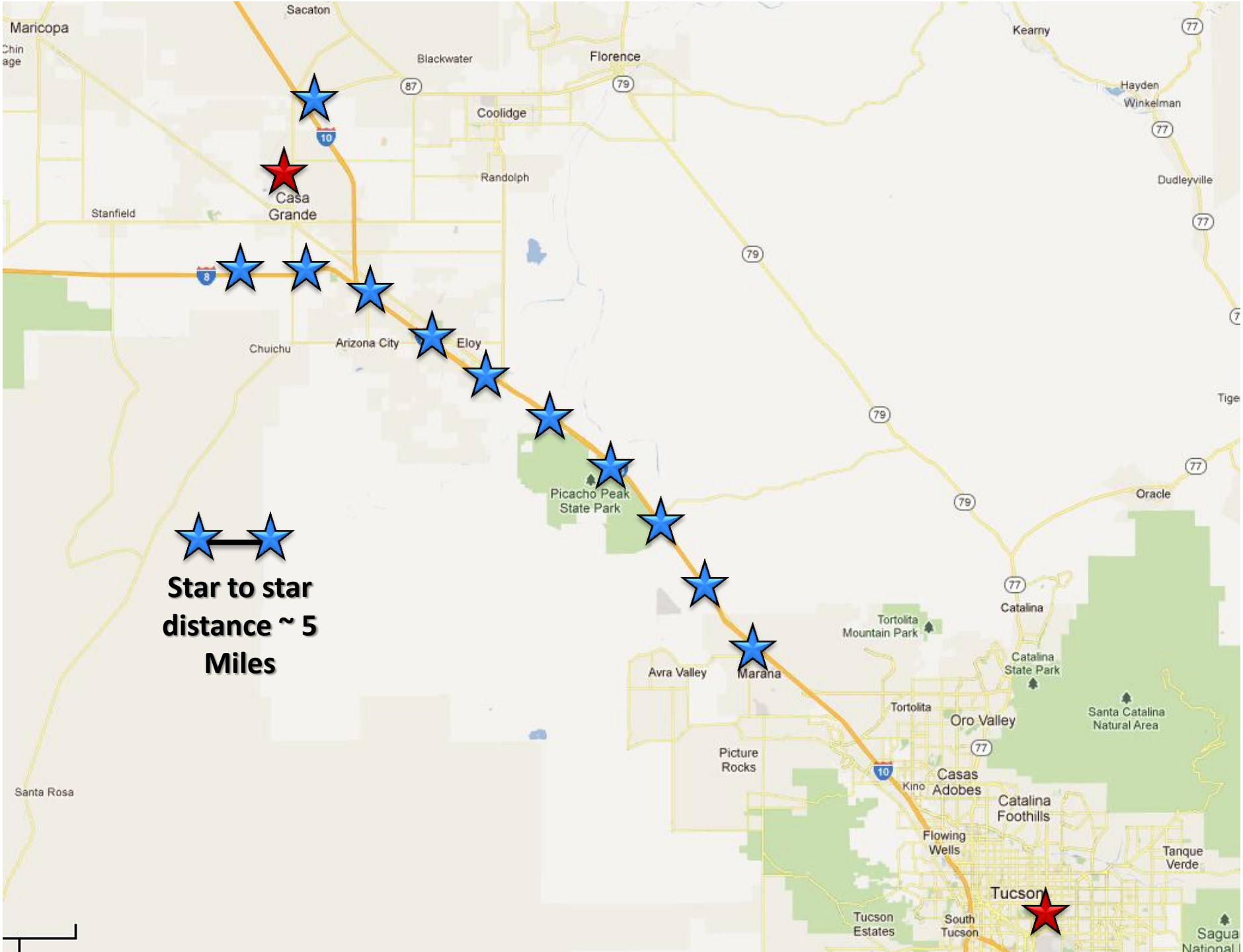
- Dust “Mesonet”
- Campbel Scientific Weather Stations
  - ~$9,000 to $16,000 per station
- Measures
  - Visibility
  - Dust
  - Soil Moisture
  - Plus web cam

Why Observations?

- **Improve Situational Awareness**
  - **Winds drive dust**
- **Calibrate the Model/Satellite Data**
- **Web cams – see the dust**





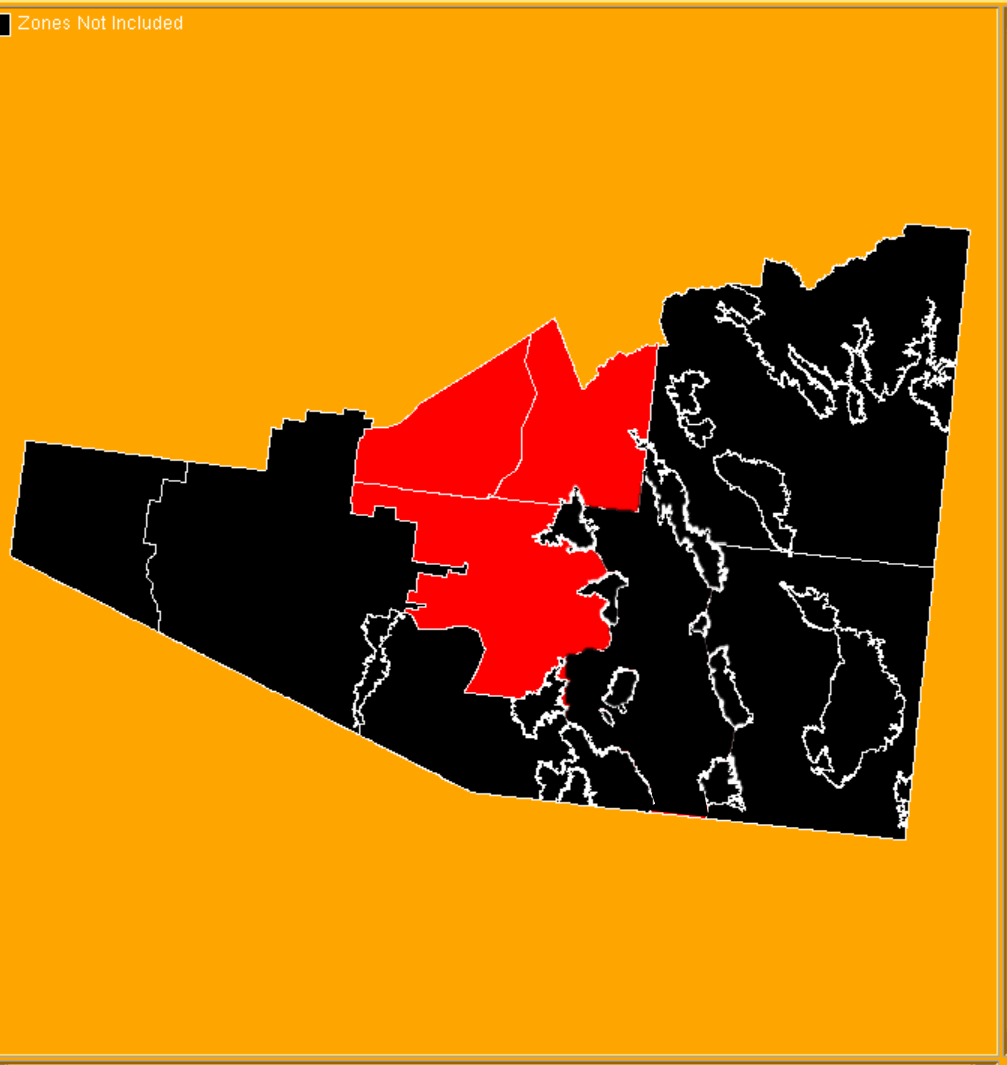

Maricopa
Sacaton
Blackwater
Florence
Kearny
Hayden
Winkelman
Coolidge
Randolph
Dudleyville
Casa Grande
Stanfield
Chuichu
Arizona City
Eloy
Picacho Peak State Park
Oracle
Catalina
Tortolita Mountain Park
Catalina State Park
Avra Valley
Marana
Tortolita
Oro Valley
Santa Catalina Natural Area
Picture Rocks
Casas Adobes
Kino
Catalina Foothills
Flowing Wells
Tanque Verde
Tucson
Tucson Estates
South Tucson
Santa Rosa
Star to star distance ~ 5 Miles

Problem Solved?

- No
- Slightly earlier detection – a plus
  - Haboobs – more lead-time
  - Windy days with localized dust – not so much
- Still very little if any lead-time on impacts to I-10
- No effective method to notify drivers
  - No radio coverage

State of the Ground

MakeHazard



Select Hazard

- AF.Y -- ASHFALL ADVISORY
- DU.Y -- BLOWING DUST ADVISORY
- FG.Y -- DENSE FOG ADVISORY
- SM.Y -- DENSE SMOKE ADVISORY
- DS.W -- DUST STORM WARNING
- EH.W -- EXCESSIVE HEAT WARNING
- EH.A -- EXCESSIVE HEAT WATCH
- FZ.W -- FREEZE WARNING
- FZ.A -- FREEZE WATCH
- ZF.Y -- FREEZING FOG ADVISORY
- FR.Y -- FROST ADVISORY
- HZ.W -- HARD FREEZE WARNING
- HT.Y -- HEAT ADVISORY
- HW.W -- HIGH WIND WARNING
- HW.A -- HIGH WIND WATCH
- WI.Y -- WIND ADVISORY

21:00Z Wed 29-Feb-12

Hazard Start Time

00:00Z Thu 01-Mar-12

Hazard End Time

Zoom In

Zoom Out

Zoom 1:1

Clear All

Select All

Map Labels

USING MAP SELECTIONS

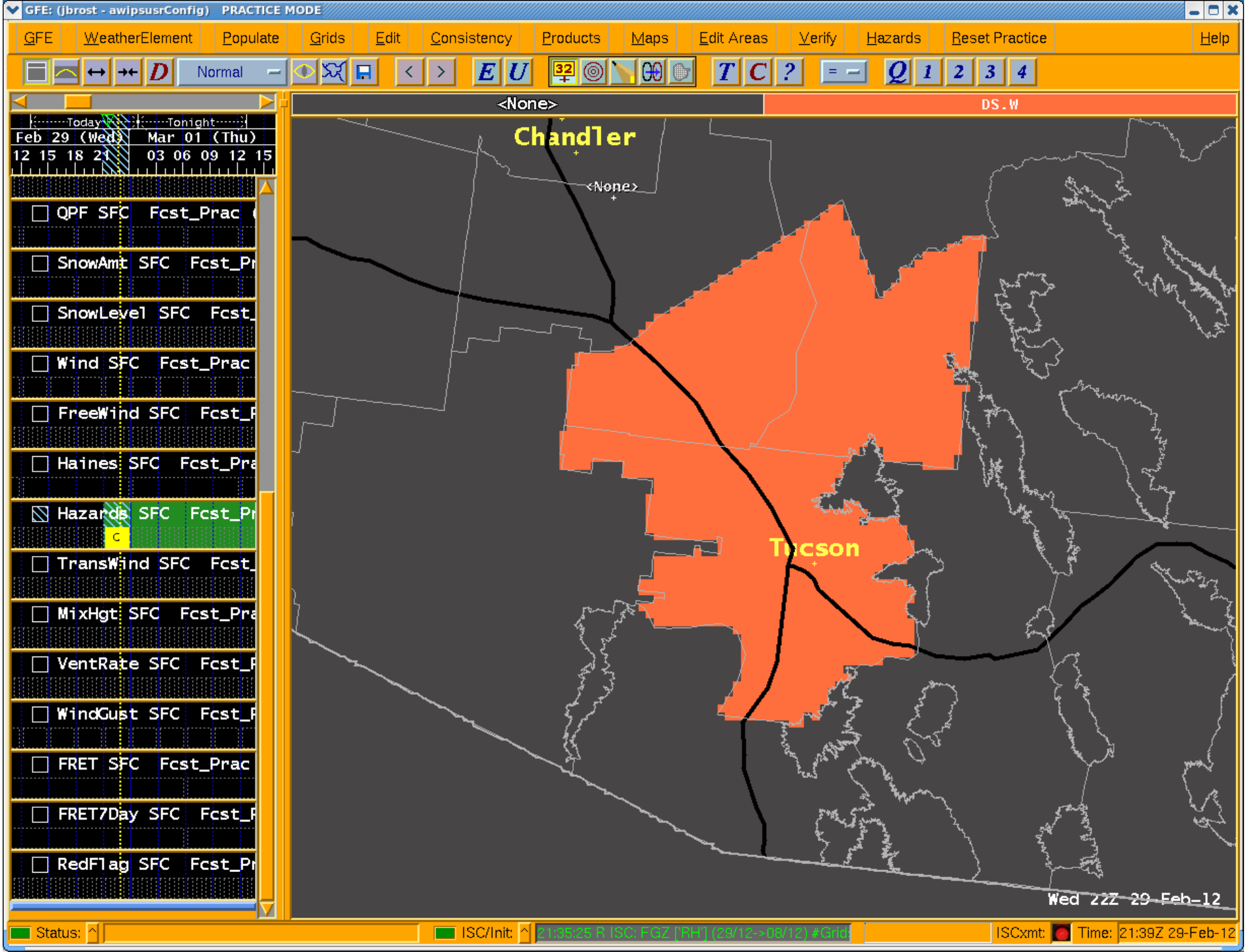
- Winter Weather
- Non-Precipitation
- Hydrology
- Fire Weather
- Convective Watches

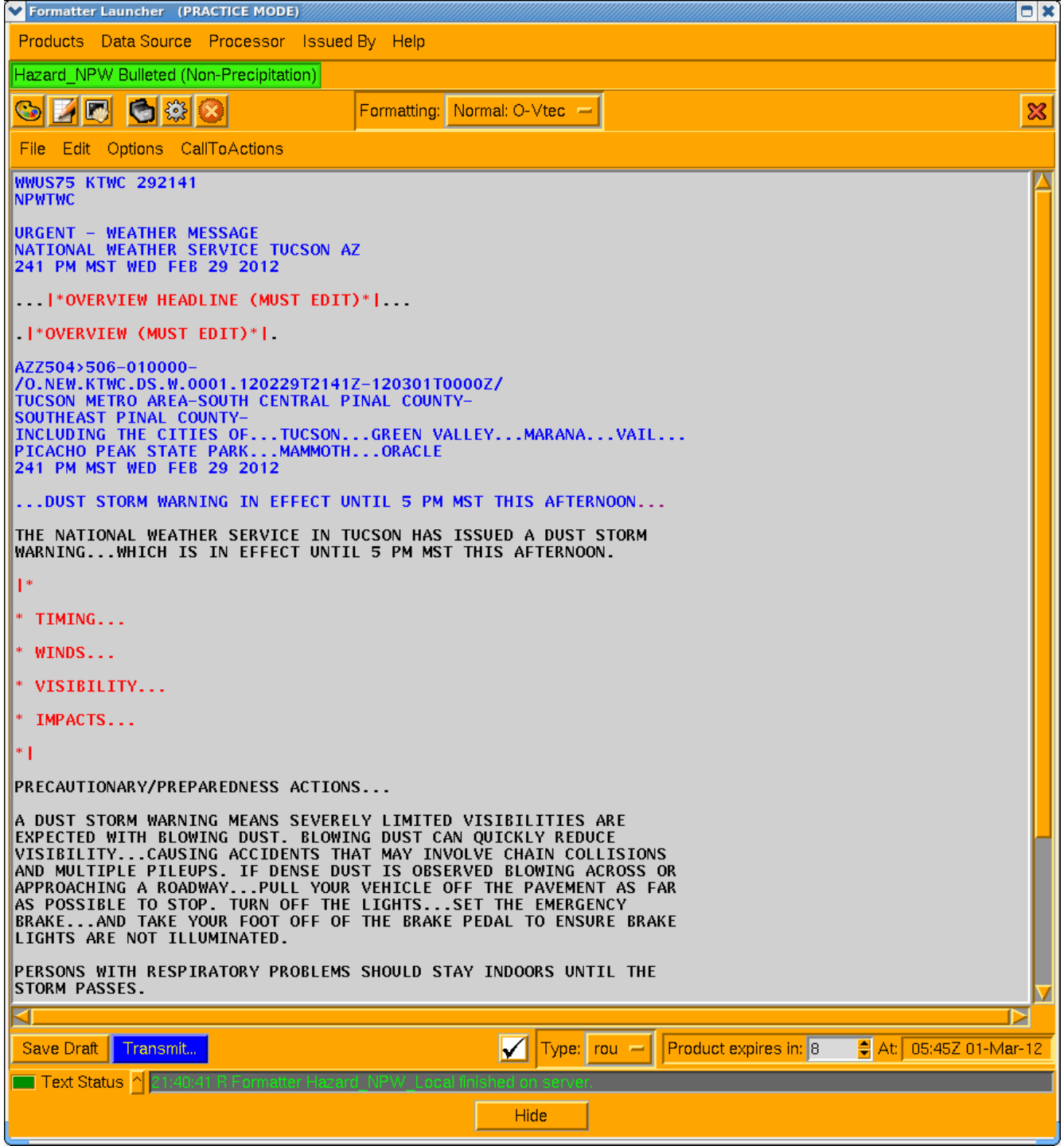
ETN / Segment Number

Run

Run/Dismiss

Cancel


GFE: (jbrost - awipsusrConfig) PRACTICE MODE
GFE
WeatherElement
Populate
Grids
Edit
Consistency
Products
Maps
Edit Areas
Verify
Hazards
Reset Practice
Help
Normal
Today
Tonight
Feb 29 (Wed)
Mar 01 (Thu)
12 15 18 21
03 06 09 12 15
QPF SFC Fcst_Prac
SnowAmt SFC Fcst_Pr
SnowLevel SFC Fcst_
Wind SFC Fcst_Prac
FreeWind SFC Fcst_F
Haines SFC Fcst_Pra
Hazards SFC Fcst_Pr
TransWind SFC Fcst_
MixHgt SFC Fcst_Pra
VentRate SFC Fcst_F
WindGust SFC Fcst_F
FRET SFC Fcst_Prac
FRET7Day SFC Fcst_F
RedFlag SFC Fcst_Pr
<None>
DS.W
Chandler
<None>
Tucson
Wed 22Z 29-Feb-12
Status:
ISC/Init:
21:35:25 R ISC: FGZ ['RH'] (29/12->08/12) #Grid
ISCxmt:
Time: 21:39Z 29-Feb-12


Formatter Launcher (PRACTICE MODE)
Products Data Source Processor Issued By Help
Hazard_NPW Bulleted (Non-Precipitation)
Formatting: Normal: O-Vtec
File Edit Options CallToActions
WWUS75 KTWC 292141
NPWTWC
URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE TUCSON AZ
241 PM MST WED FEB 29 2012
...|*OVERVIEW HEADLINE (MUST EDIT)*|...
.|*OVERVIEW (MUST EDIT)*|.
AZZ504>506-010000-
/O.NEW.KTWC.DS.W.0001.120229T2141Z-120301T0000Z/
TUCSON METRO AREA-SOUTH CENTRAL PINAL COUNTY-
SOUTHEAST PINAL COUNTY-
INCLUDING THE CITIES OF...TUCSON...GREEN VALLEY...MARANA...VAIL...
PICACHO PEAK STATE PARK...MAMMOTH...ORACLE
241 PM MST WED FEB 29 2012
...DUST STORM WARNING IN EFFECT UNTIL 5 PM MST THIS AFTERNOON...
THE NATIONAL WEATHER SERVICE IN TUCSON HAS ISSUED A DUST STORM
WARNING...WHICH IS IN EFFECT UNTIL 5 PM MST THIS AFTERNOON.
|*
* TIMING...
* WINDS...
* VISIBILITY...
* IMPACTS...
*|
PRECAUTIONARY/PREPAREDNESS ACTIONS...
A DUST STORM WARNING MEANS SEVERELY LIMITED VISIBILITIES ARE
EXPECTED WITH BLOWING DUST. BLOWING DUST CAN QUICKLY REDUCE
VISIBILITY...CAUSING ACCIDENTS THAT MAY INVOLVE CHAIN COLLISIONS
AND MULTIPLE PILEUPS. IF DENSE DUST IS OBSERVED BLOWING ACROSS OR
APPROACHING A ROADWAY...PULL YOUR VEHICLE OFF THE PAVEMENT AS FAR
AS POSSIBLE TO STOP. TURN OFF THE LIGHTS...SET THE EMERGENCY
BRAKE...AND TAKE YOUR FOOT OFF OF THE BRAKE PEDAL TO ENSURE BRAKE
LIGHTS ARE NOT ILLUMINATED.
PERSONS WITH RESPIRATORY PROBLEMS SHOULD STAY INDOORS UNTIL THE
STORM PASSES.
Save Draft
Transmit...
Type: rou
Product expires in: 8
At: 05:45Z 01-Mar-12
Text Status
21:40:41 R Formatter Hazard_NPW_Local finished on server.
Hide

Current Warning Technique

- **Work best on days identified as a high dust threat**
  - **Typically in winter/fall**
  - **Strong wind driven events (not thunderstorm related)**
- **Typically takes between 5 to 10 minutes to generate warning**

What Can We Do?

- Model the dust (UofA)
  - Predict wind speeds/directions
- Identify weather patterns that promote dust events
  - Warn for the dust prone days well in advance of the dust events
- Heighten awareness
  - Workshops
  - Interviews
  - Facebook/Web Page

Thank You

John.Brost@noaa.gov