



Observing Dust

★ How the NWS Observes, Predicts and Warns for Dust Events ★

John J. Brost

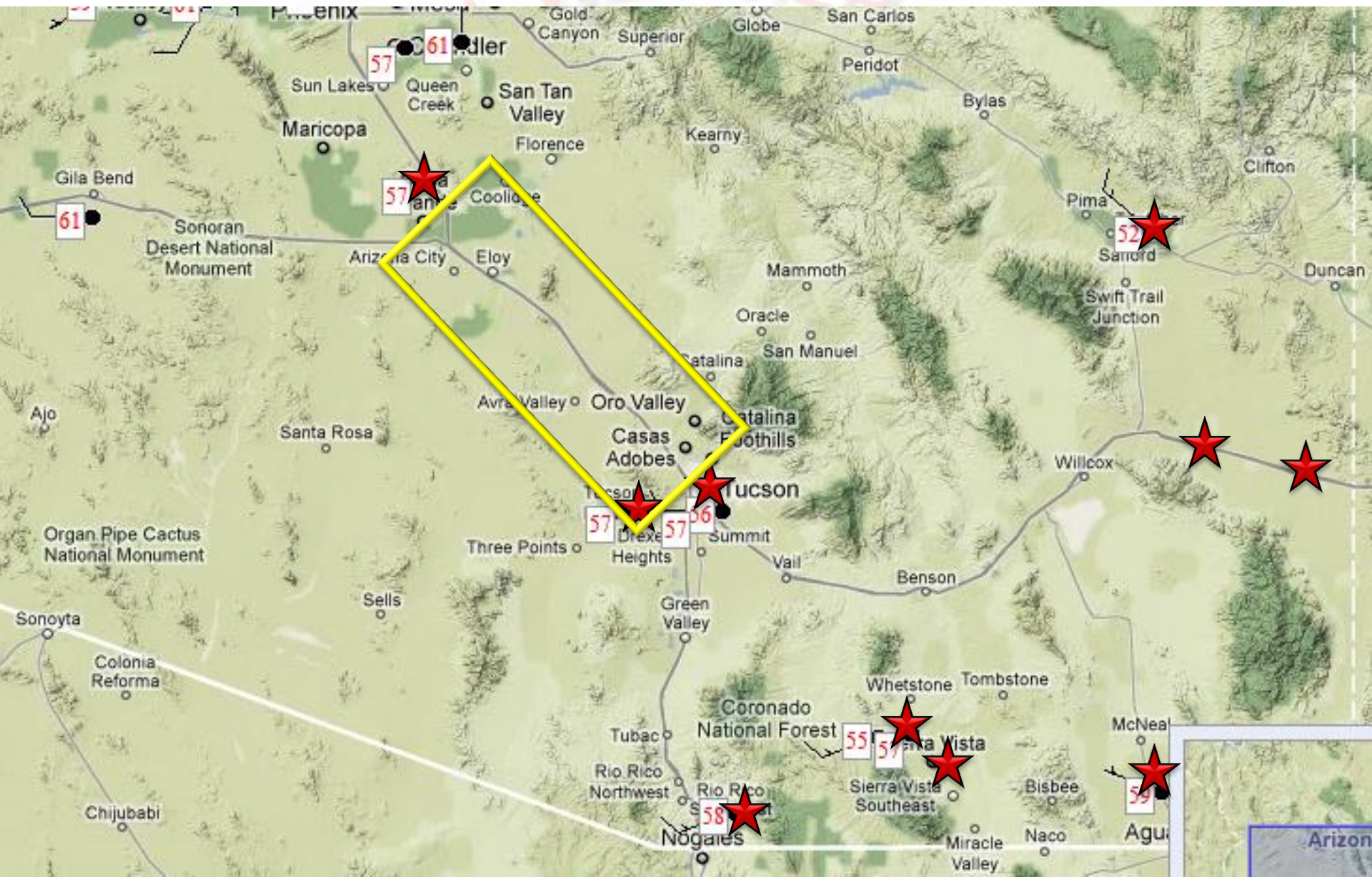
Science and Operations Officer

NWS Tucson, AZ

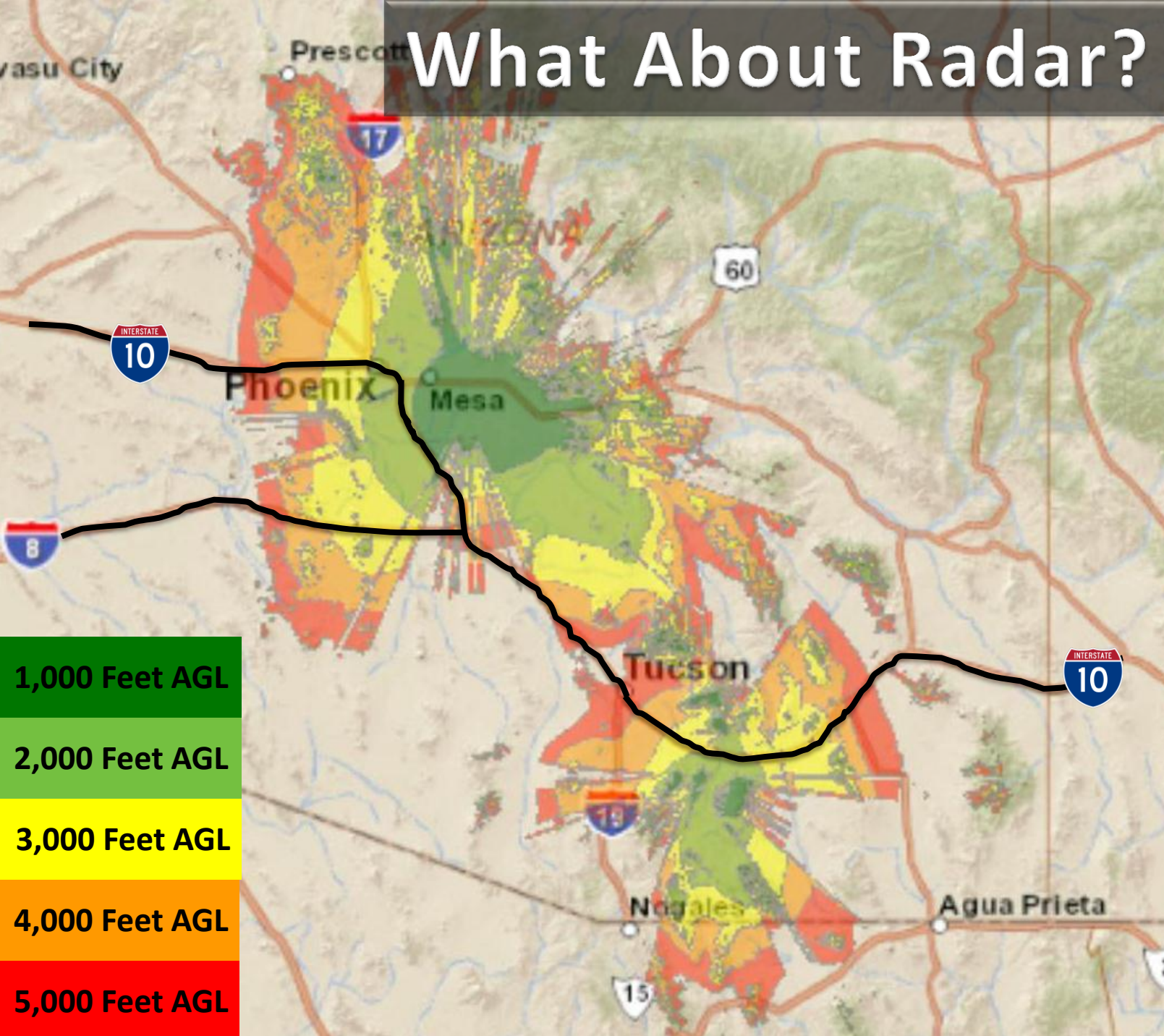
Discussion Topics

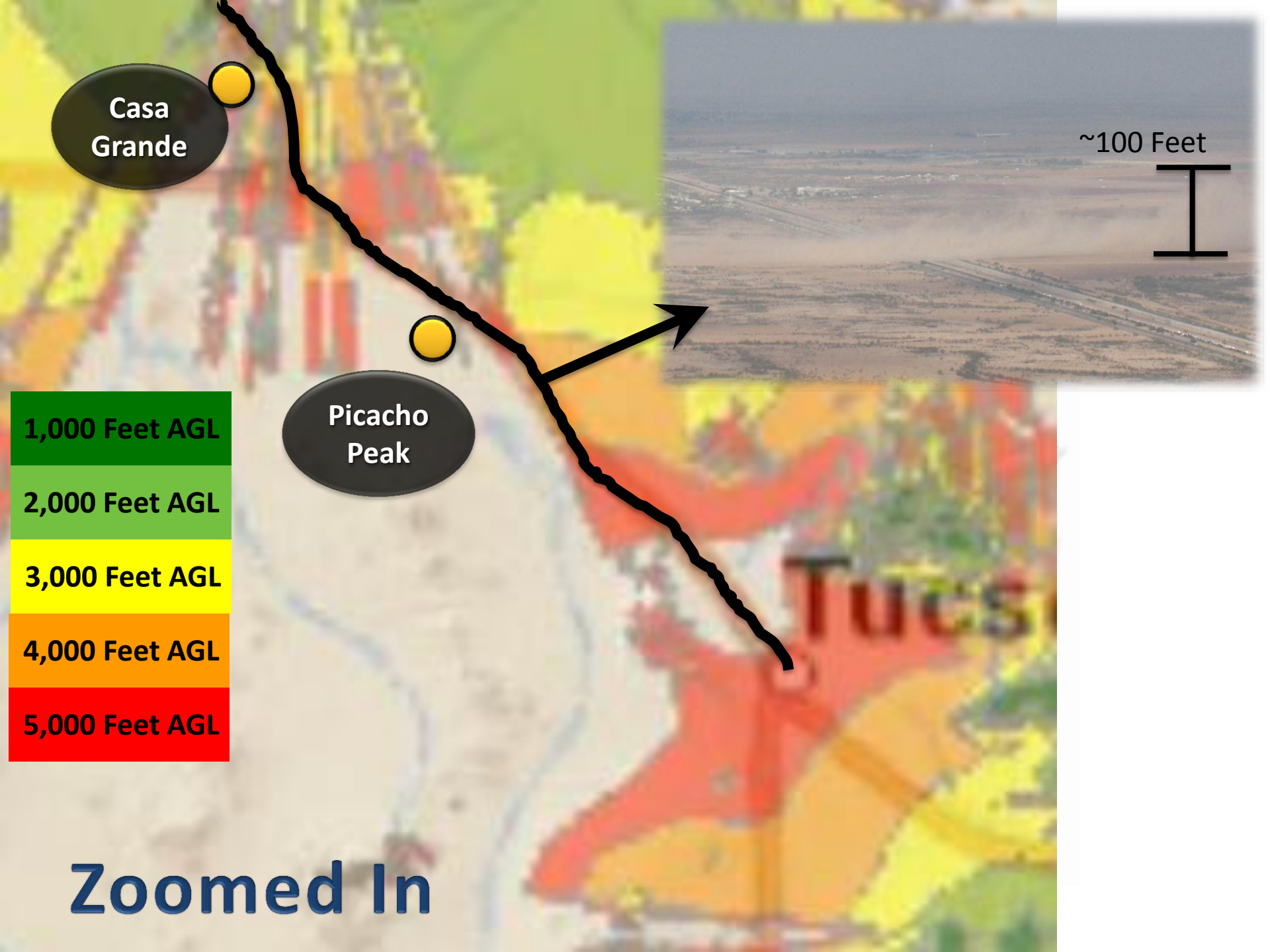
- **How do we observe dust today?**
- **How can we improve dust detection?**
- **What are our limitations?**
- **How do we warn for dust?**
- **How can we improve warning strategies?**

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

Zoomed In

TUCSON

How Do We Detect Dust?

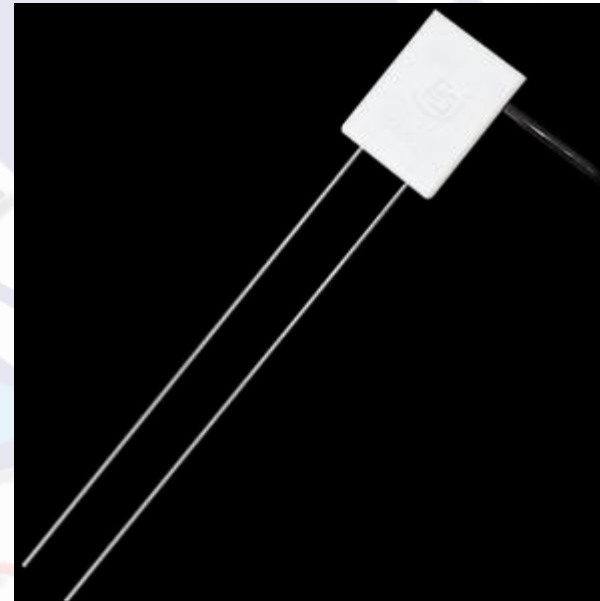
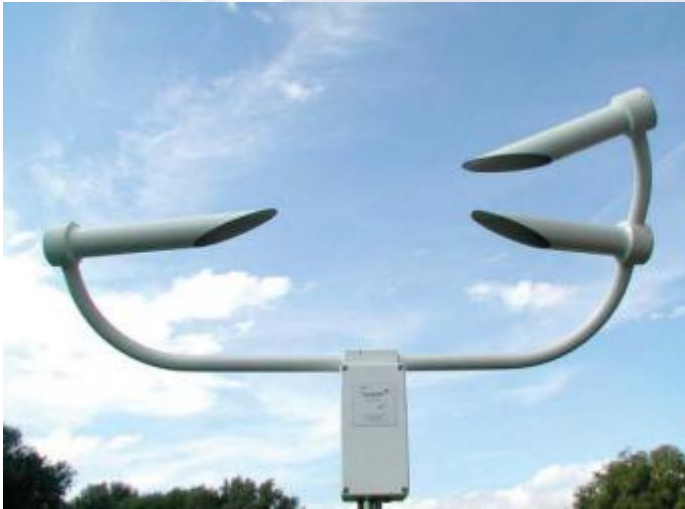
- **Media**
 - 3 T.V.'s in operations serve as “Situational Awareness”
 - Usually an accident on I-10 triggers media coverage
- **Spotters or Public reports**
 - “It’s really dusty here”
- **DPS**
 - “When will the dust end – we are working an accident on I-10”

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

Chin
age

Sacaton

Blackwater

Florence

Kearny

Hayden
Winkelman

87

79

77

Coolidge

77

Randolph

Dudleyville

77

Stanfield

Casa
Grande

79

8

10

Chuichu

Arizona City

Eloy

79

Picacho Peak
State Park

79

77

Oracle



**Star to star
distance ~ 5
Miles**

Avra Valley

Marana

Tortolita
Mountain Park

Catalina

Catalina
State Park

Santa Catalina
Natural Area

Santa Rosa

Picture
Rocks

Tortolita

Oro Valley

77

Casas
Adobes

Catalina
Foothills

Flowing
Wells

Tanque
Verde

Tucson

Tucson
Estates

South
Tucson

Sagua
National

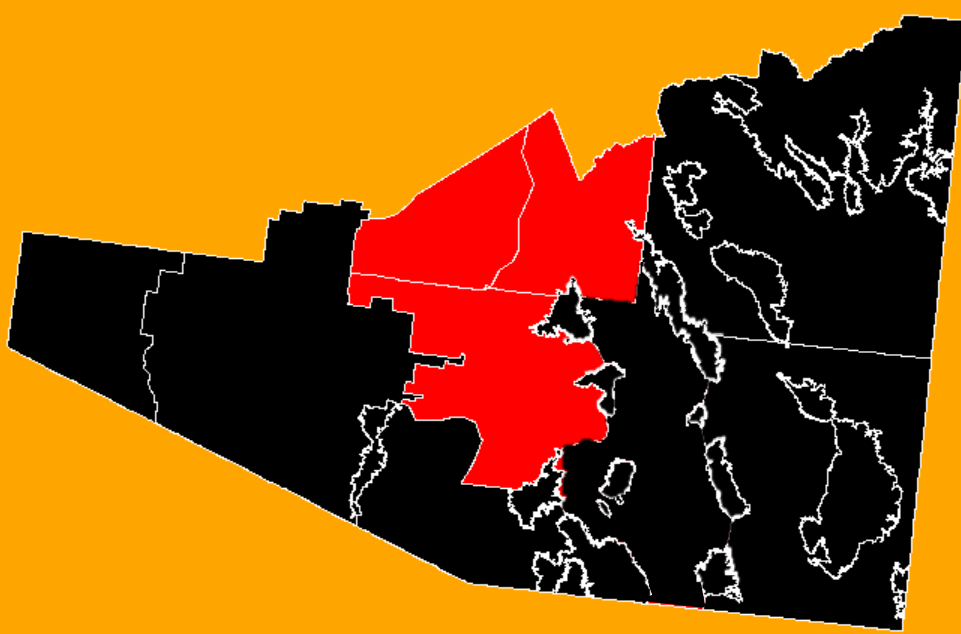
Problem Solved?

- **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



Zones Not Included



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

Slider control for Hazard Start Time

00:00Z Thu 01-Mar-12

Hazard End Time

Slider control for 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

Input field for ETN / Segment Number

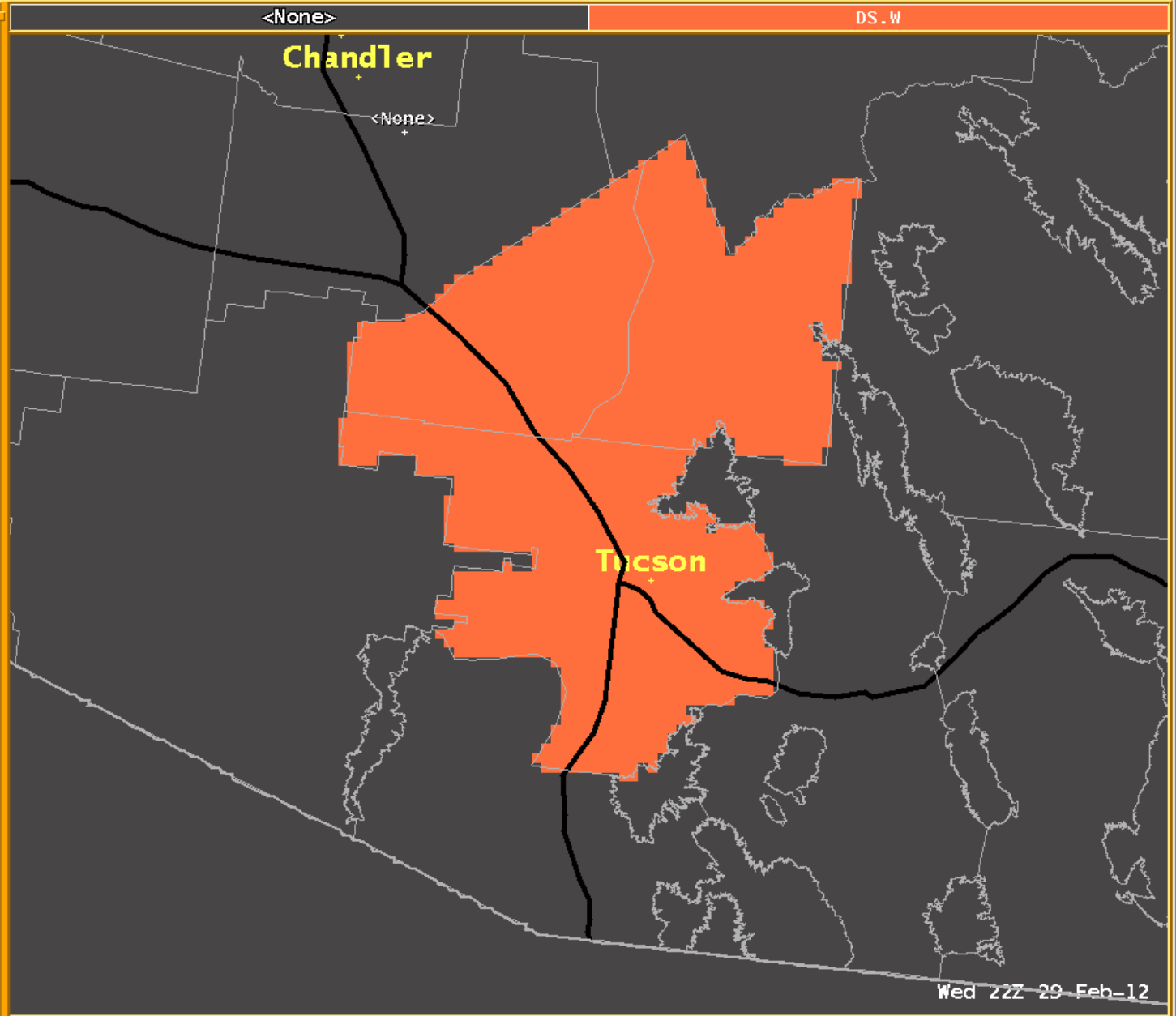
Run

Run/Dismiss

Cancel

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_P
- Haines SFC Fcst_Pra
- Hazards SFC Fcst_Pr
- TransWind SFC Fcst_
- MixHgt SFC Fcst_Pra
- VentRate SFC Fcst_P
- WindGust SFC Fcst_P
- FRET SFC Fcst_Prac
- FRET7Day SFC Fcst_P
- RedFlag SFC Fcst_P



Wed 22Z 29 Feb 12

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

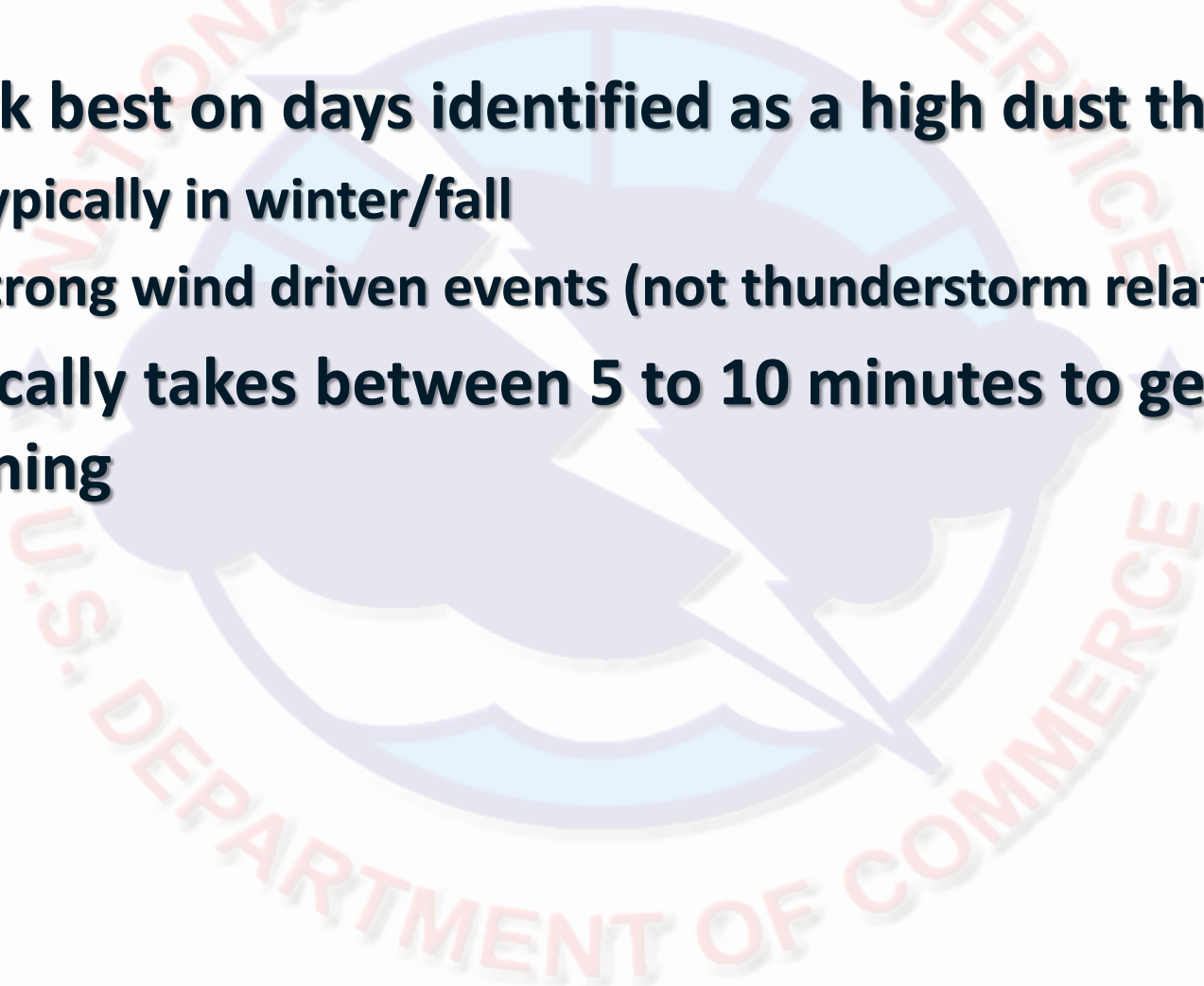
Text Status

11:40:41 AM 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

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