



# DUST – DETECTION, PREDICTION, AND WARNINGS

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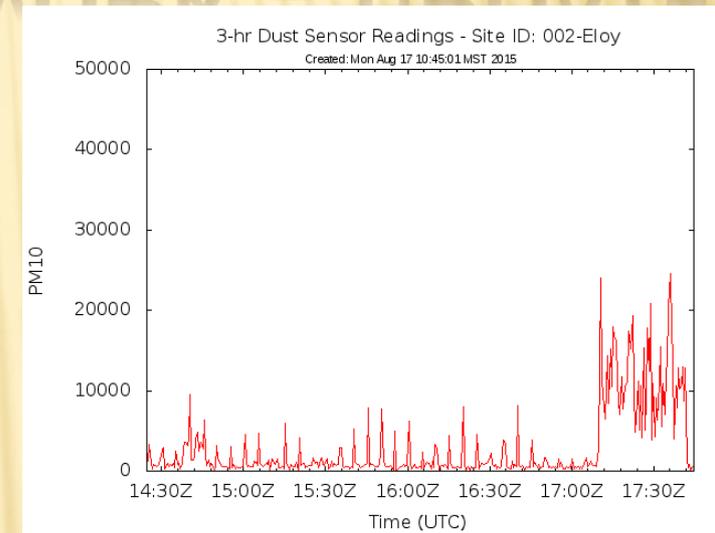
Feb. 28, 2017

Casa Grande



# DUST DETECTION NETWORK – UPDATE

- Experimental Concept:
  - Use inexpensive new technologies
  - Maximize spatial density
  - Use available communications capabilities
  - Automate sending of dust visibility alerts
- Technology was proven in 2015 and 2016 to be able to detect dust conditions using inexpensive IoT devices (e.g. Arduino, Raspberry Pi)
  - January 31<sup>st</sup> 2016 two sensors detected dust conditions with alerts delivered to the NWS before any advisories/warnings were issued



## Motivation

Take advantage of new low-cost technologies (e.g., Internet of Things [IoT])

- Arduino
- Raspberry Pi
- Air particulate sensors





# DUST DETECTION NETWORK – UPDATE

- Experiences during 2016 spring/summer:
  - Problem with corrupted storage cards (micro-SD) on the Raspberry Pi
  - Networking issues with sensors disconnecting from the wired Ethernet network
  - Remoteness of locations combined with personnel/medical limitations during summer of 2016 made it difficult to conduct maintenance



# DUST DETECTION NETWORK – UPDATE

- Moving forward
  - Will continue to set up experimental dust sensors, time permitting
  - Restore failed sensor packages
  
- Use lessons learned and concept of operation to support new dust sensor I-10 project



# NWS WARNINGS CHANGES

- Two upcoming changes:
  - New Dust Storm Warnings!
  - New NWS Phoenix Public

**For those familiar with trying to decipher all our warning products and zones.....**



**What warning would you like?**



# DUST STORM WARNING CHANGES

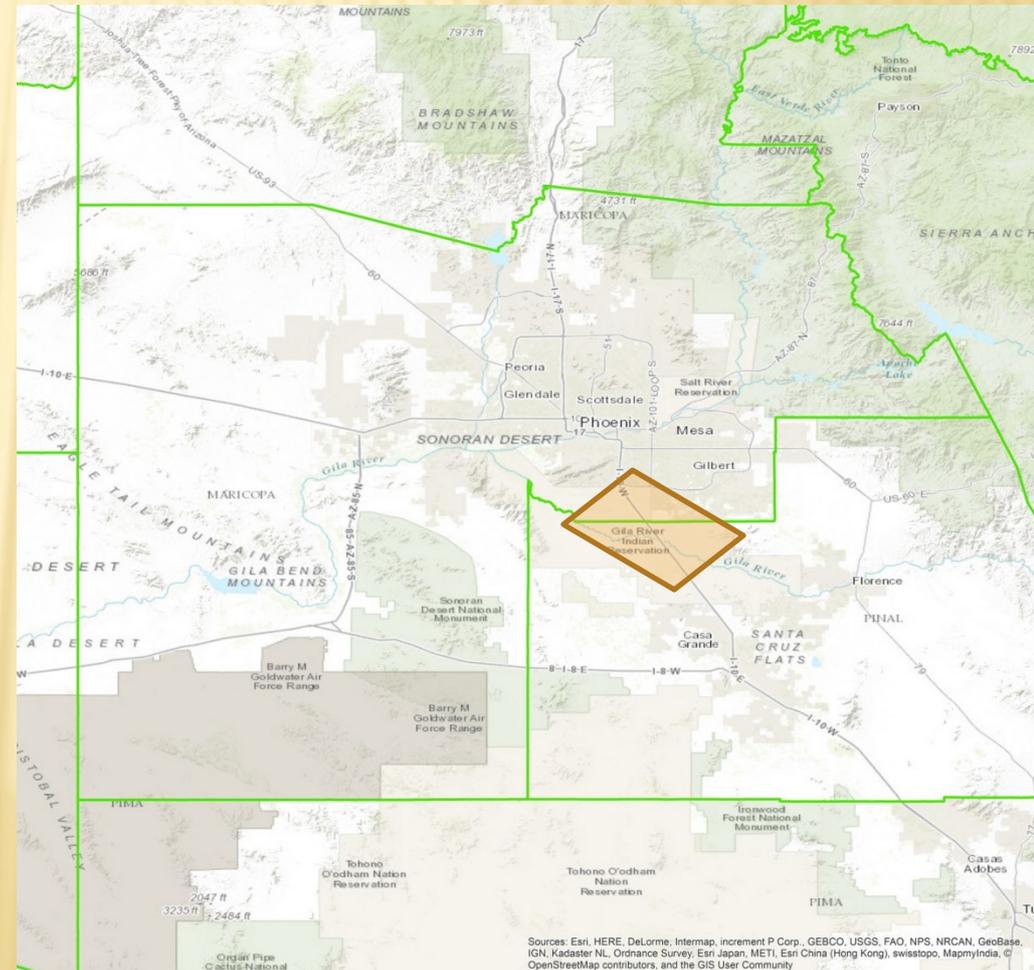
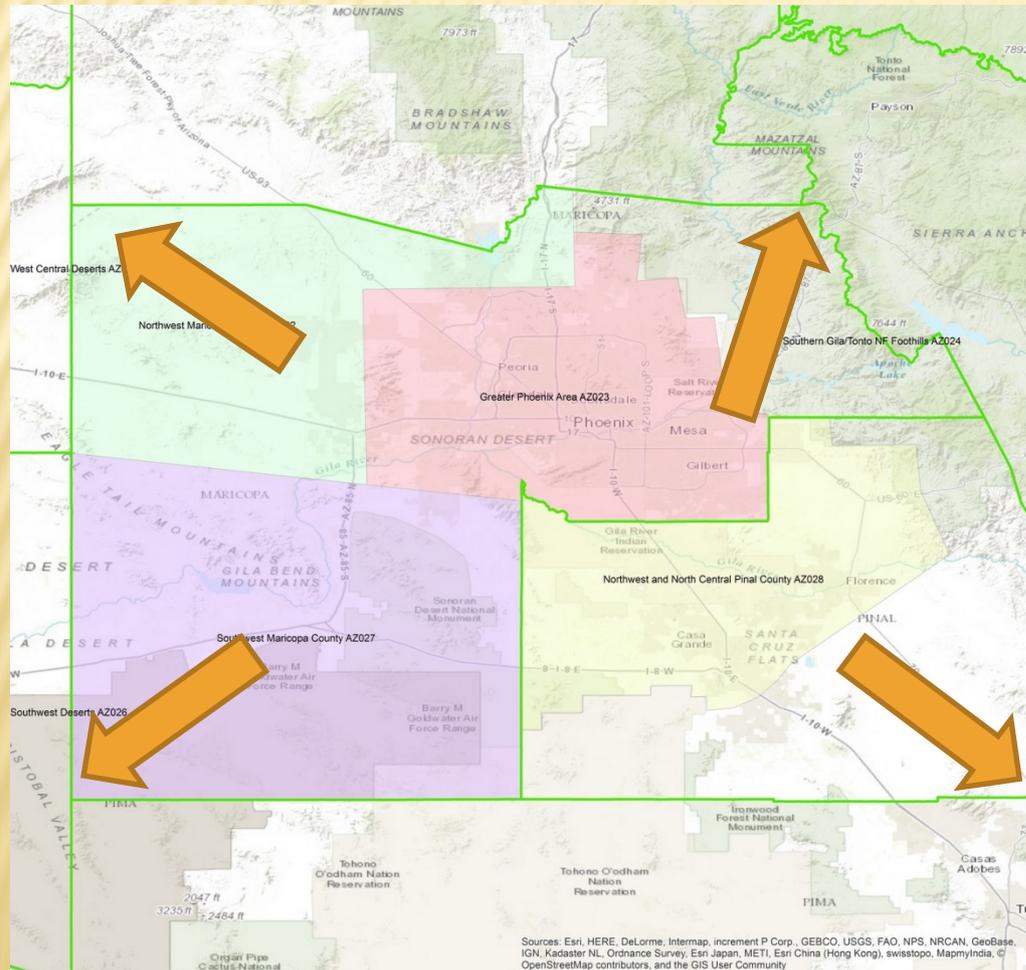
- Effective around October 2017
  - New Polygon Dust Storm Warning
  - **First major NWS warning upgrade in years!**
  - At least 10 years in the making
- What this means:
  - NWS will be able to issue Dust Storm Warnings much more quickly
  - NWS will be able to define the threat area just the same as Tornado Warnings are done
  - Wireless Emergency Alerts (WEA) will no longer be sent to multiple counties at the same time—only sent to those inside the polygon. **RESULT: Estimated 90% reduction** in the number of cell phones that will be alerted



# DUST STORM WARNING CHANGES

BEFORE

AFTER





# NWS PHOENIX ZONE CHANGES

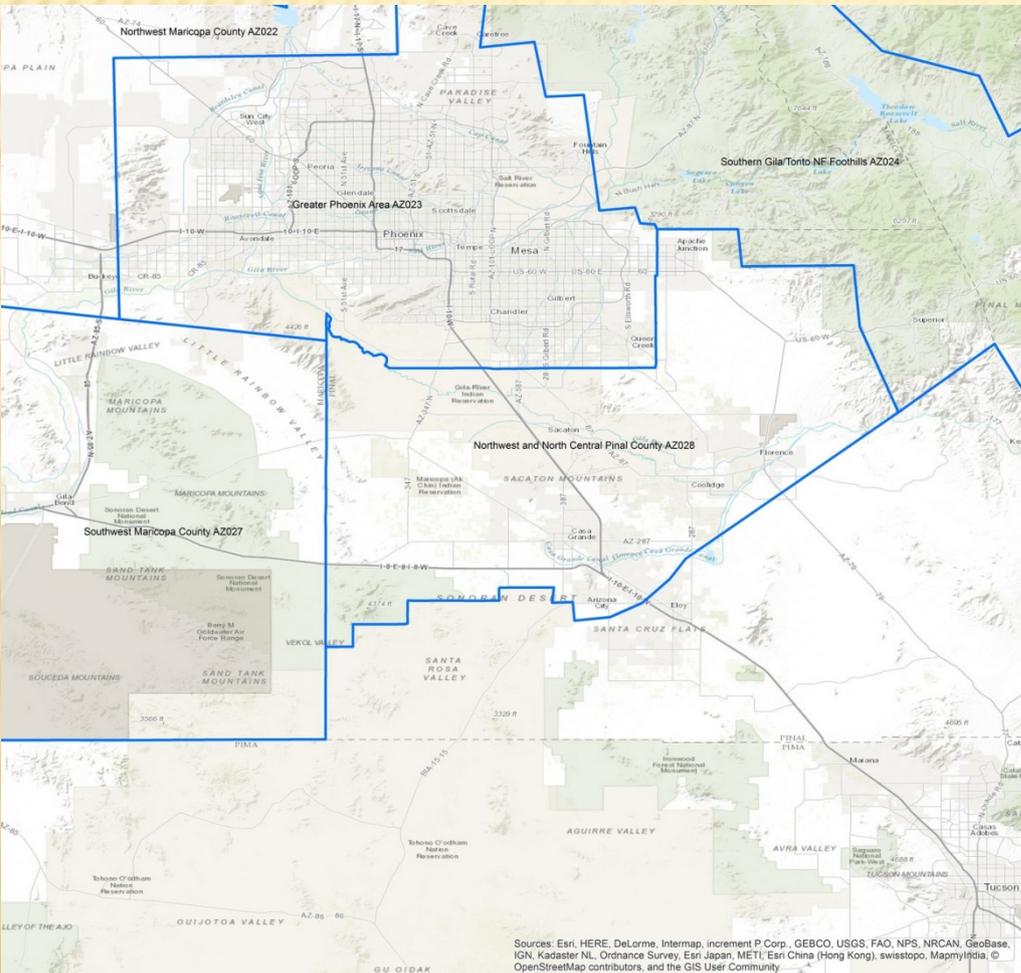
- Public zones increased from 13 to 45 effective April 4, 2017
- Dust storm warnings are issued by public zones
- Some zones were designed to map common dust storm areas
- This will have most impact between **April 2017** and when the Dust Storm Warning polygons become operational around **Oct 2017**
- Likely some modest improvement in reducing number of cell phones alerted



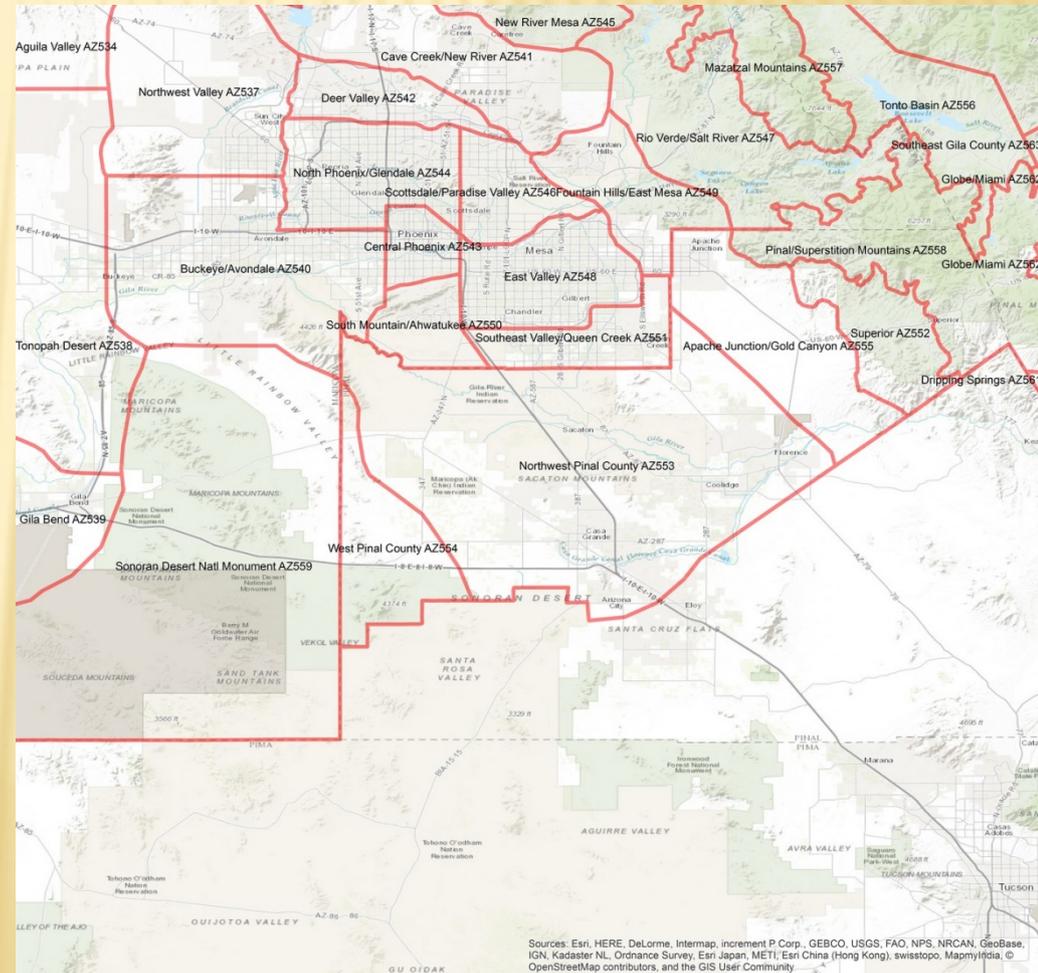
# NWS PHOENIX ZONE CHANGES

## BEFORE

## AFTER



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



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# NEW SATELLITE CAPABILITIES



GOES-16 launched Nov 2016

Operational sometime in 2017

May give us better monitoring tool for some dust storms

FUTURE

CURRENT

- Three times more spectral information
- Four times greater spatial resolution
- Five times faster coverage
- Real-time mapping of total lightning activity
- Increased thunderstorm and tornado warning lead time
- Improved hurricane track and intensity forecasts
- Improved monitoring of solar x-ray flux
- Improved monitoring of solar flares and coronal mass ejections
- Improved geomagnetic storm forecasting<sup>[6]</sup>

GOES-15 IMAGER 13 SEP 10 18:31 UTC VISIBLE

GOES-13 IMAGER 13 SEP 10 18:15 UTC VISIBLE

ASPB@UW



# I-10 reopens after crashes near New Mexico border

Yihyun Jeong, The Republic | azcentral.com Published 1:15 p.m. MT Feb. 26, 2017 | Updated 7 hours ago



(Photo: Arizona Department of Public Safety)

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Interstate 10 has reopened after three separate crashes involving eight vehicles closed the highway in both directions near the Arizona-New Mexico border for nearly four hours Sunday afternoon, officials said.

According to the Arizona Department of Transportation, lanes reopened shortly after 4 p.m. near San Simon after closing due to the crashes and blowing dust.

Two people sustained minor injuries and the multiple collisions remained under investigation, according to the Arizona Department of Public Safety. Zero visibility was reported in the area, according to DPS.

The closure was about 15 miles west of the New Mexico state line.



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# QUESTIONS?



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