

# The Phoenix-Area Hailstorms of October 5, 2010

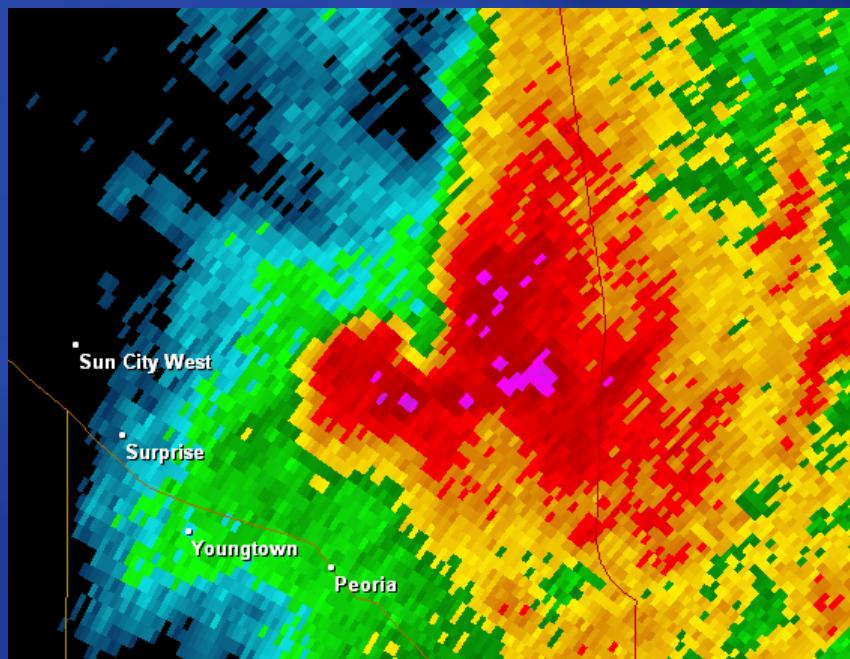


Photo: courtesy Sarah Walters

Gary Woodall

National Weather Service – Phoenix, AZ

[www.weather.gov/phoenix](http://www.weather.gov/phoenix)



# Event Impacts

- Series of severe storms, some displaying supercell characteristics
- Widespread hail, up to 3 inch diameter
- Over 20,000 buildings damaged by hail
- Over 10,000 vehicles damaged
- Power poles broken by downburst winds
- Flash flooding in north Phoenix, I-17 blocked



# Arizona Hail Records

Largest hail ever reported in PHX metro area

1. 9/28/95 4.50" Coconino Co./Mayer
2. 3/12/58 4.00" Graham Co./E. of Safford
3. 8/25/00 3.00" Maricopa Co./Phoenix
4. 8/28/98 3.00" Pima Co./Tucson
5. 7/20/98 3.00" Coconino Co./SE of Flagstaff
6. 6/13/55 3.00" Gila Co./NW of Payson City
7. 8/15/99 2.75" Yavapai Co./Black Canyon City
8. 9/18/99 2.75" Yavapai Co./NE of Prescott
9. 9/28/95 2.75" Maricopa Co./Cave Creek
10. 7/25/90 2.75" Maricopa Co./Cave Creek
11. 9/5/70 2.50" Maricopa Co./Scottsdale



# 12 UTC Upper-Level Composite

Large upper low over central CA

10 deg C dewpoints at 850 mb, 10 kt winds

SSW winds of 30-45 kt at 700 mb

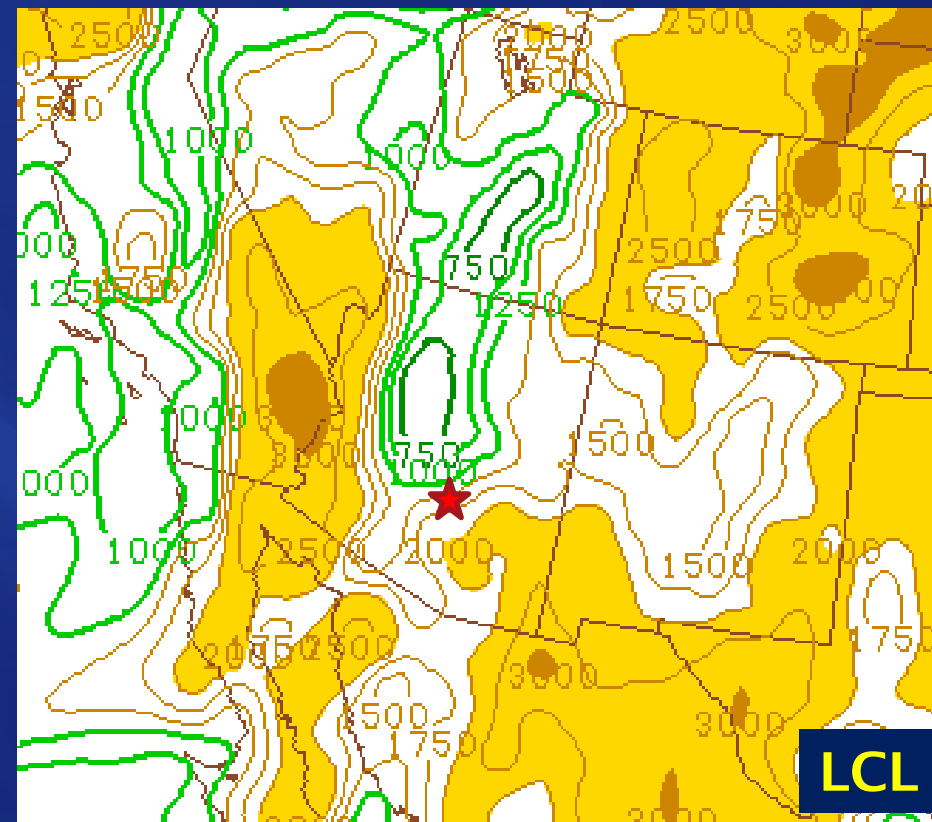
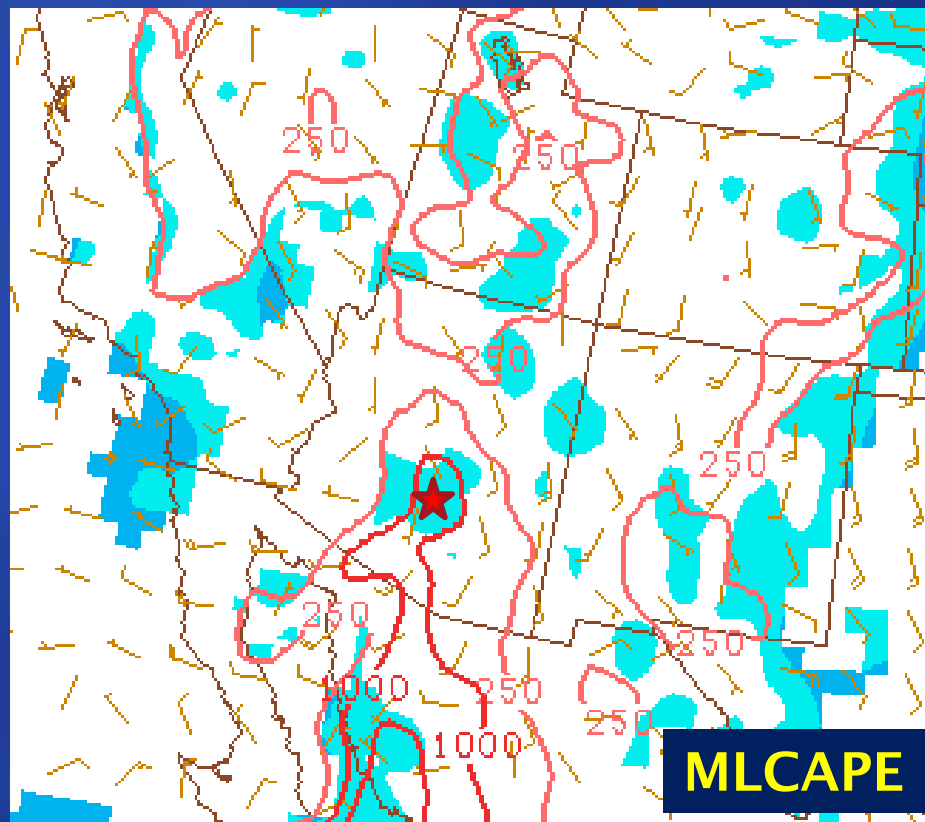
50-55 kt winds at 500 mb, mid-level cold advection

Substantial shortwave approaching

Modest CAPE, ample speed shear, limited directional shear

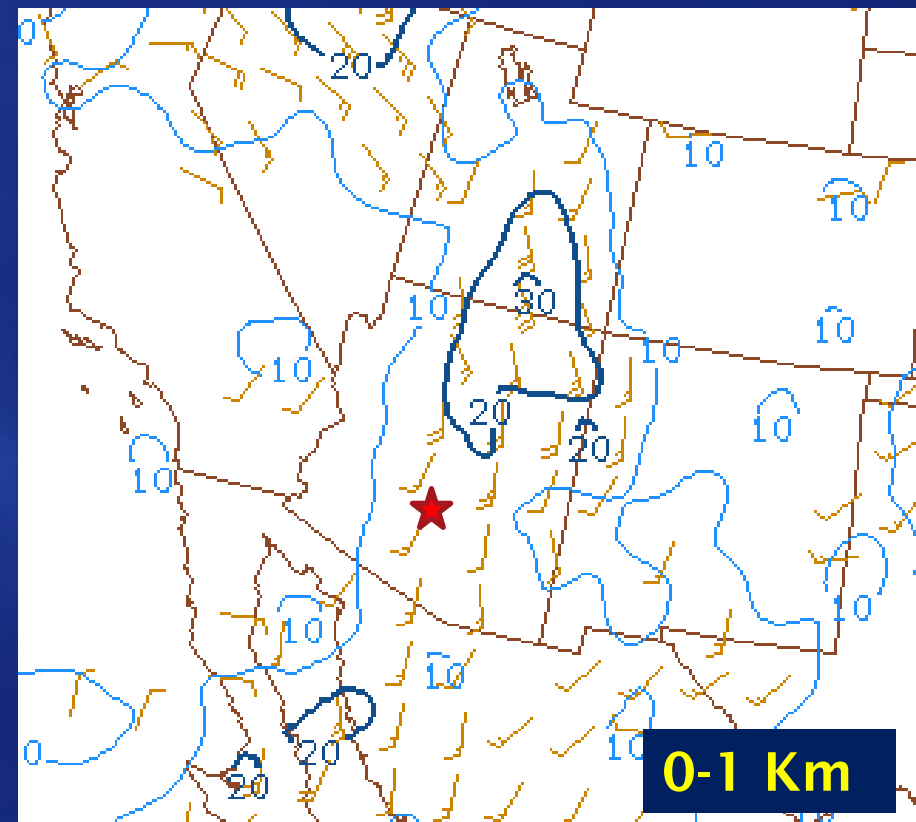
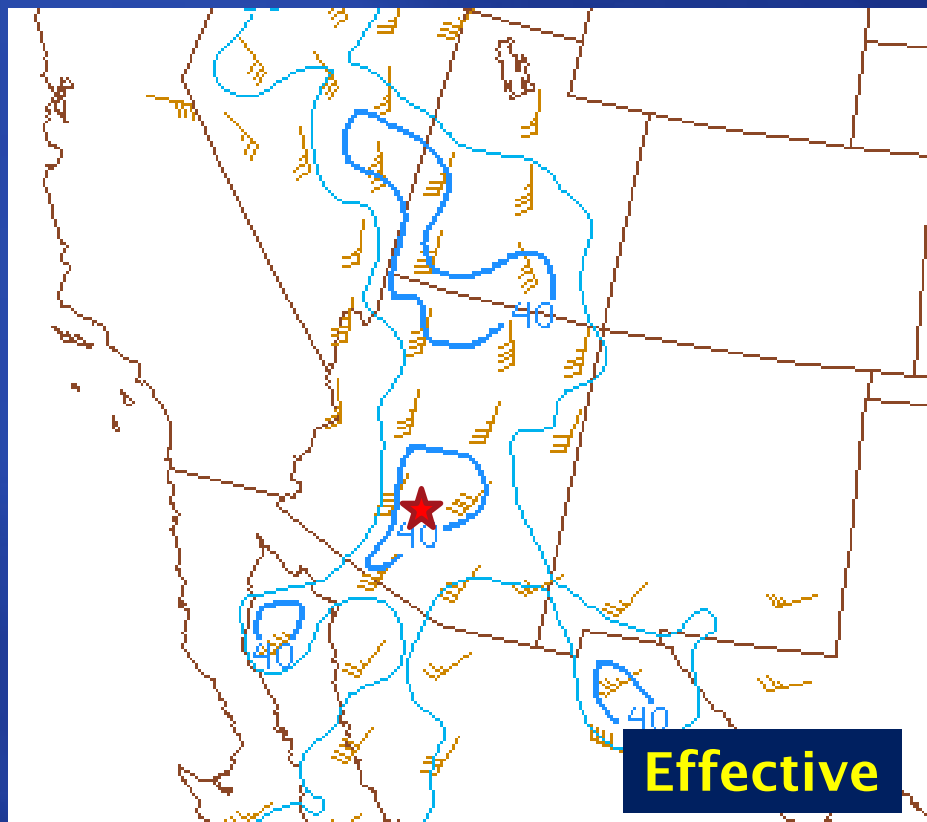


# 22Z MLCAPE and LCL



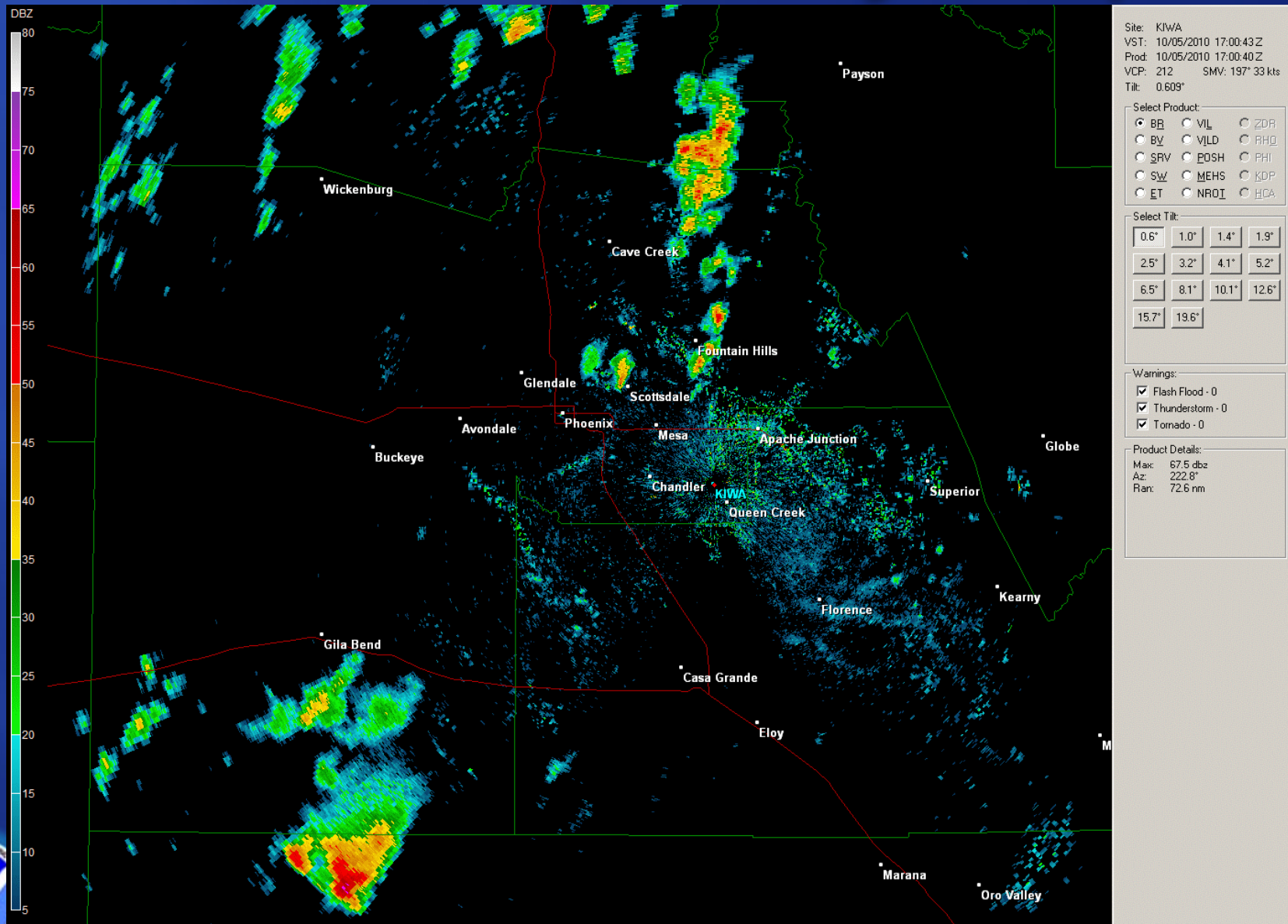
1000+ J/Kg through event  
Slight decrease by late afternoon (earlier storms)  
LCLs 1200-1500 m

# 22 UTC Vertical Wind Shear

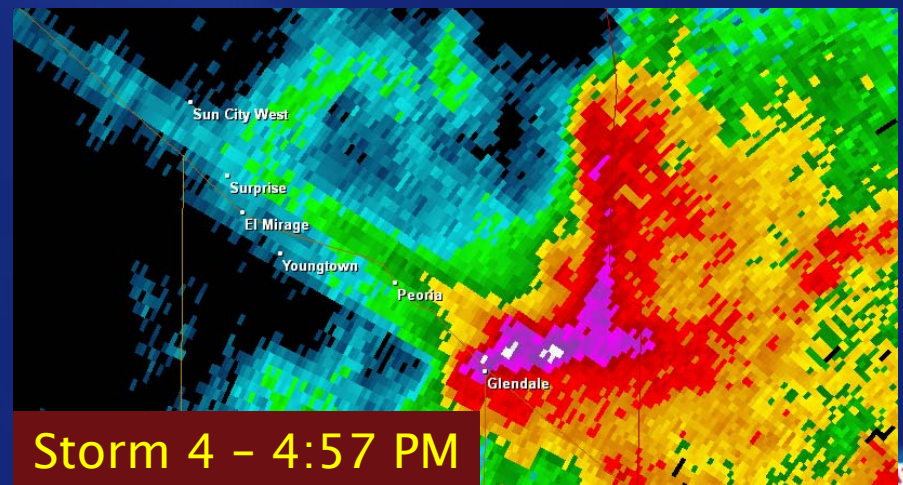
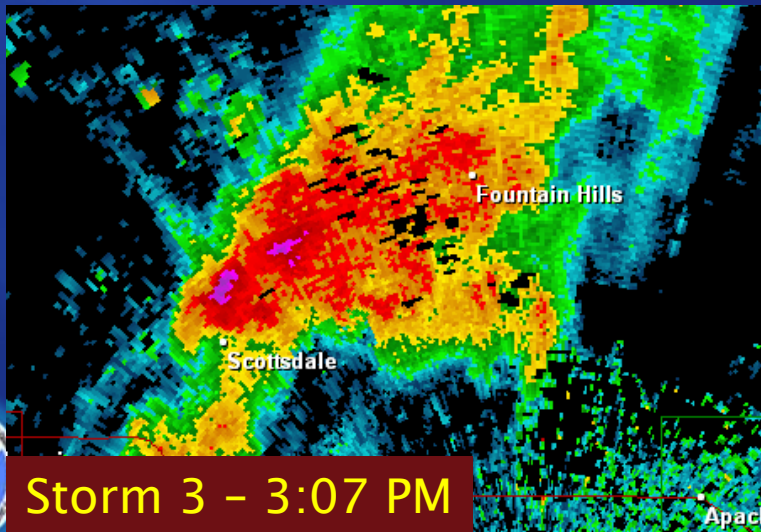
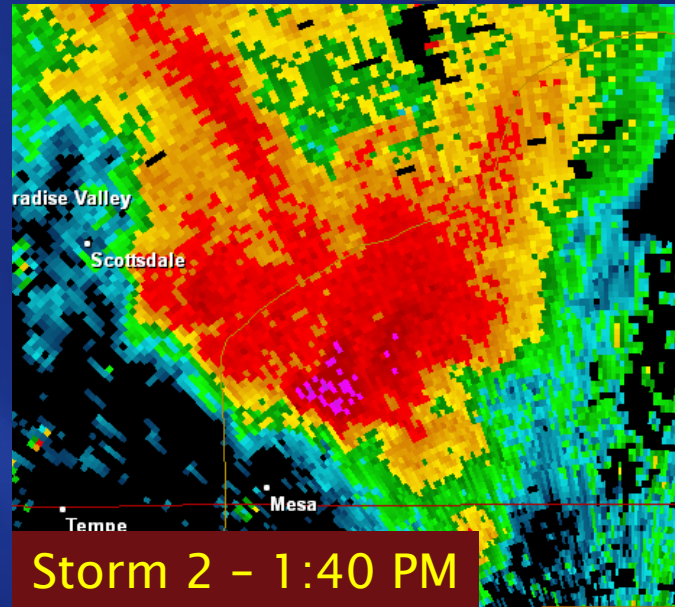
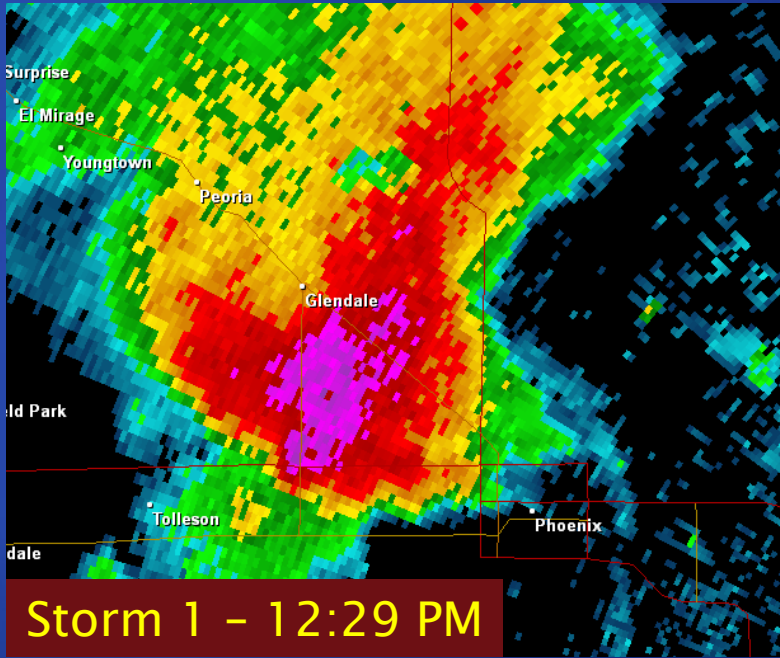


40-50 kt effective shear (50% of EL height)  
0-1 Km varied between 10-20 kts

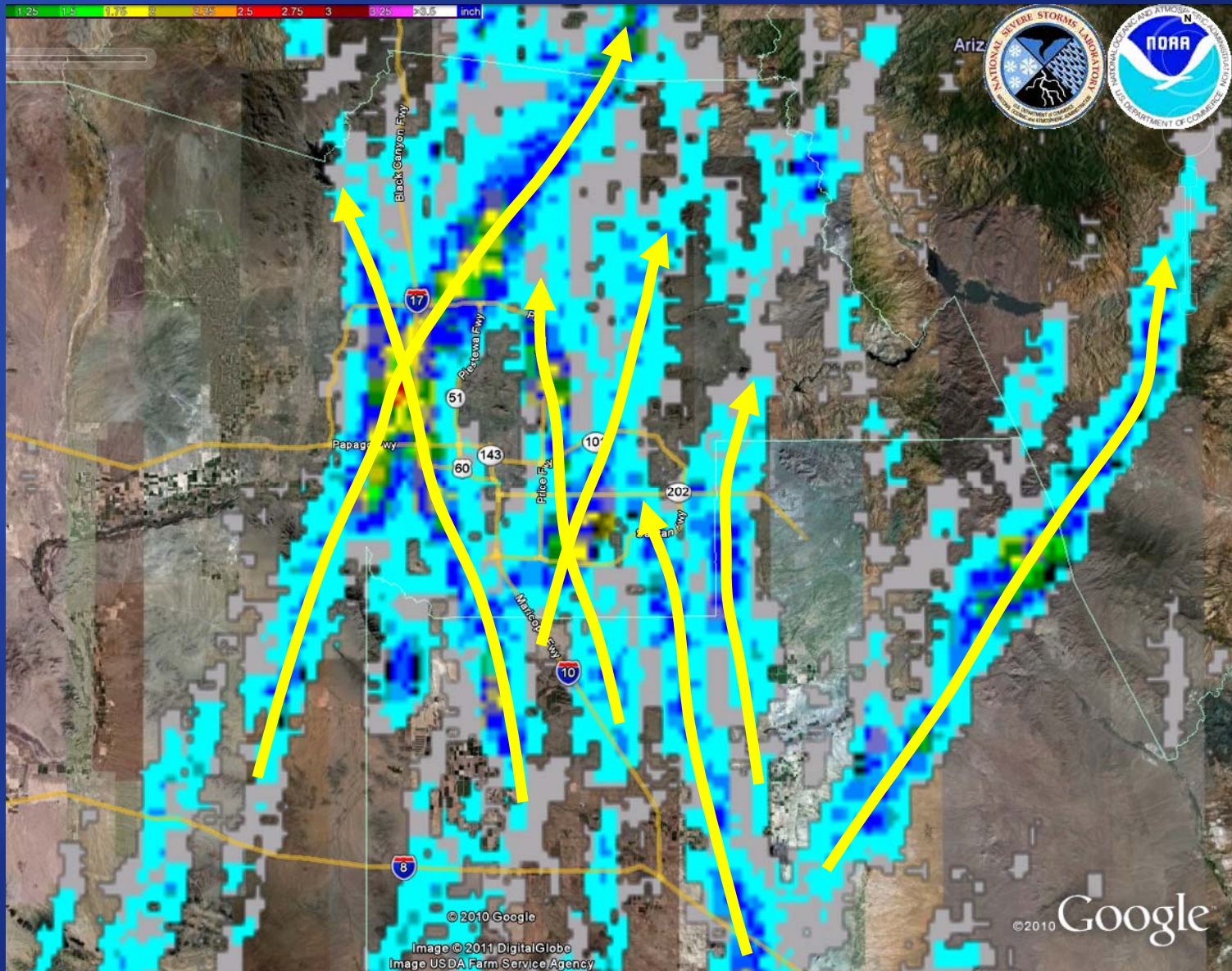
# KIWA Reflectivity Loop



# KIWA Radar Images



# WDSS-2 Hail Tracks



# Storm Images

Photo: Margaret Faulkner



Photo: KPNX-TV



Photo: Rob Carlmark



Photo: Tracy Randall



# NWS Phoenix Operations

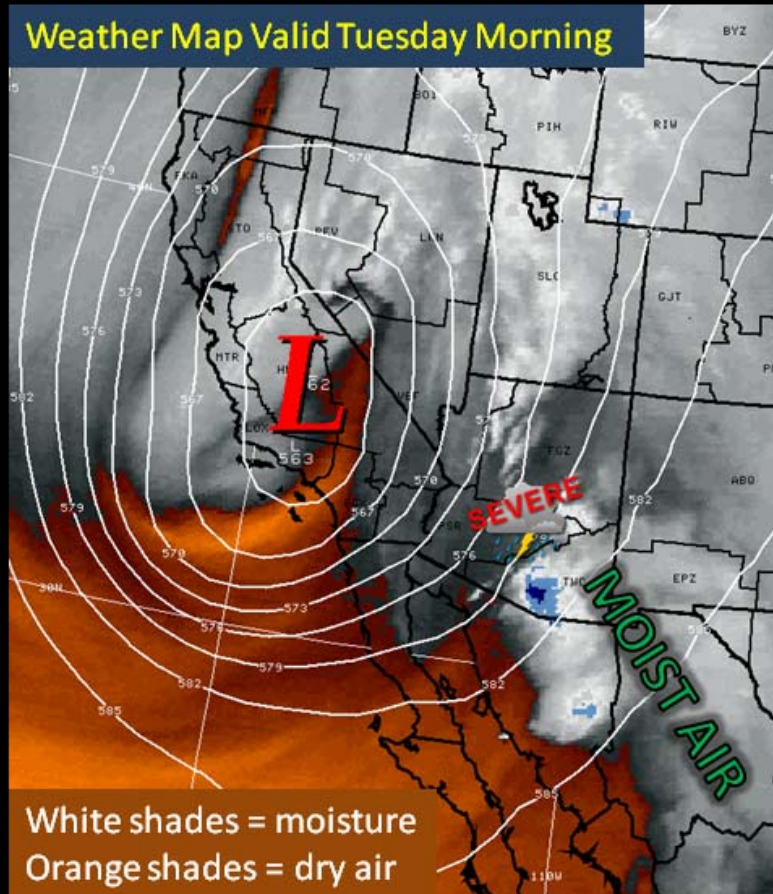
- 2 warning forecasters
  - Sectorized operations
- Coordinator/Statement/NWSChat
- 2 spotter report loggers, LSR generators
- 2 on-duty forecasters
  - Assisted with phones, “extra sets of eyes”



# Decision Support – Web Graphics

**Showers & Thunderstorms Likely Today across South Central Arizona...Some may be Severe!**

Weather Map Valid Tuesday Morning



White shades = moisture  
Orange shades = dry air

**A large Pacific low will interact with deep moisture to produce scattered **strong** thunderstorms today over south central Arizona.**

**IMPACTS...**

**Scattered thunderstorms with **damaging winds...hail** and **heavy rain** are possible...mostly from Phoenix eastward.**

# Decision Support - NWSChat

- [22:37:02] <nws-ken.waters@nwschat.weather.gov/Home> Issued one last SVR for that long-lived storm that has done substantial damage. If it keeps going it will be in the Flagstaff NWS office's area.
- [22:39:14] <nws-gary.woodall@nwschat.weather.gov/Home> Next round may be forming. Storm near casa Grande showing increasing mid-level reflectivity structures. Will watch closely, may need a SVR if trends continue.
- [22:39:26] <ham-dan.zubey@nwschat.weather.gov/ac9d7422> Ken, yes.
- [22:48:45] <nws-ken.waters@nwschat.weather.gov/Home> The last SVR was actually issued for two different cells, one near Casa Grande and the other near Stanfield, both moving NNE.
- [22:52:57] <nws-gary.woodall@nwschat.weather.gov/Home> With previous heavy rain across the area, and at least one more round/area of tstorms approaching from the south, we will issue an urban/small stream flood advisory for a fairly large portion of Maricopa and Pinal Counties.
- [22:53:19] <media-james.quinones@nwschat.weather.gov/home> How fast are these storms moving from the South?
- [22:55:38] <nws-matthew.hirsch@nwschat.weather.gov/Home> James, the storms are moving at approximately 40 kt.
- [22:56:32] <nws-matthew.hirsch@nwschat.weather.gov/Home> ~45-50 mph
- [22:58:38] <nws-gary.woodall@nwschat.weather.gov/Home> Seeing another 3-body spike at mid-levels with the storm east of Maricopa community. Large hail threat with this storm as well.
- [23:01:04] <nws-ken.waters@nwschat.weather.gov/Home> Seeing signature of likely large damaging hail between Casa Grande and Maricopa.
- [23:04:03] <nws-ken.waters@nwschat.weather.gov/Home> The storm just east of Maricopa is now moving due north and is very close to moving outside the polygon for the severe tstm warning...still severe so this may require yet another SVR to cover its movement...which is towards the sun lakes-ahwatukee area
- [23:06:47] <nws-matthew.hirsch@nwschat.weather.gov/Home> SVR coming shortly for Ahwatukee.
- [23:07:32] <media-james.quinones@nwschat.weather.gov/home> You guys are rocking by the way!
- [23:13:16] <nws-gary.woodall@nwschat.weather.gov/Home> Thanks, James...reminds me of TX. :-)
- [23:16:04] <ham-dan.zubey@nwschat.weather.gov/ac9d7422> quarter size hail on I-10 wild horse pass
- [23:16:40] <ham-dan.zubey@nwschat.weather.gov/ac9d7422> same spotter also sees wall cloud s/sw of him just to the west of the city of maricopa.
- [23:17:34] <nws-gary.woodall@nwschat.weather.gov/Home> Thanks, Dan. Radar suggests the strongest updrafts are on the west flank of the storm, so that's where any lowerings would be.

NWSChat room  
was extremely  
active

NWS, Media, EM,  
Net Controllers

“Worked the way  
it’s supposed to”

Collaboration,  
reports, decision  
processes



# Summary/Conclusions

- On October 5, the Phoenix metro area experienced the largest-ever recorded hail
- Several storms exhibited supercell characteristics and structures
- The storms formed in an environment with modest CAPE and strong deep-layer shear
- Weak low-level shear, higher LCL possibly limited low-level mesocyclone formation
- Aggressive decision support/collaboration assisted the warning system



# Questions?

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