

Forecaster Perspective on Use of
Aerosol Satellite Products:
West Coast
(A Few Days in July 2016)

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South Coast Air Quality Management District



Starting July 22, 2016

SAND FIRE

**Sand Fire: started
Friday Afternoon,
July 22 in Sand Canyon,
near Santa Clarita, CA**



Friday Evening, July 22

Smoke Drifting over Downtown Los Angeles
– 30 miles away from the Sand Fire



Daily Max Ozone and PM AQI

Friday, July 22, 2016



Basin Peak 8-hour Ozone = 118 ppb
(214 AQI = Very Unhealthy)
in the Central San Bernardino Mountains

Peak 1-hour Ozone = 164 ppb
in Central San Bernardino Mountains
(Highest 1-Hour Ozone since 2009)



Santa Clarita 24-hour PM2.5 = 4.3 $\mu\text{g}/\text{m}^3$

Basin Peak 24-hour PM2.5 = 20.6 $\mu\text{g}/\text{m}^3$
(69 AQI = Moderate – in West San Fernando Valley)

Central Los Angeles Peak 1-Hour PM2.5 = 25 $\mu\text{g}/\text{m}^3$

Reseda Peak 1-Hour PM2.5 = 29 $\mu\text{g}/\text{m}^3$

Santa Clarita Peak 1-Hour PM2.5 = 11 $\mu\text{g}/\text{m}^3$

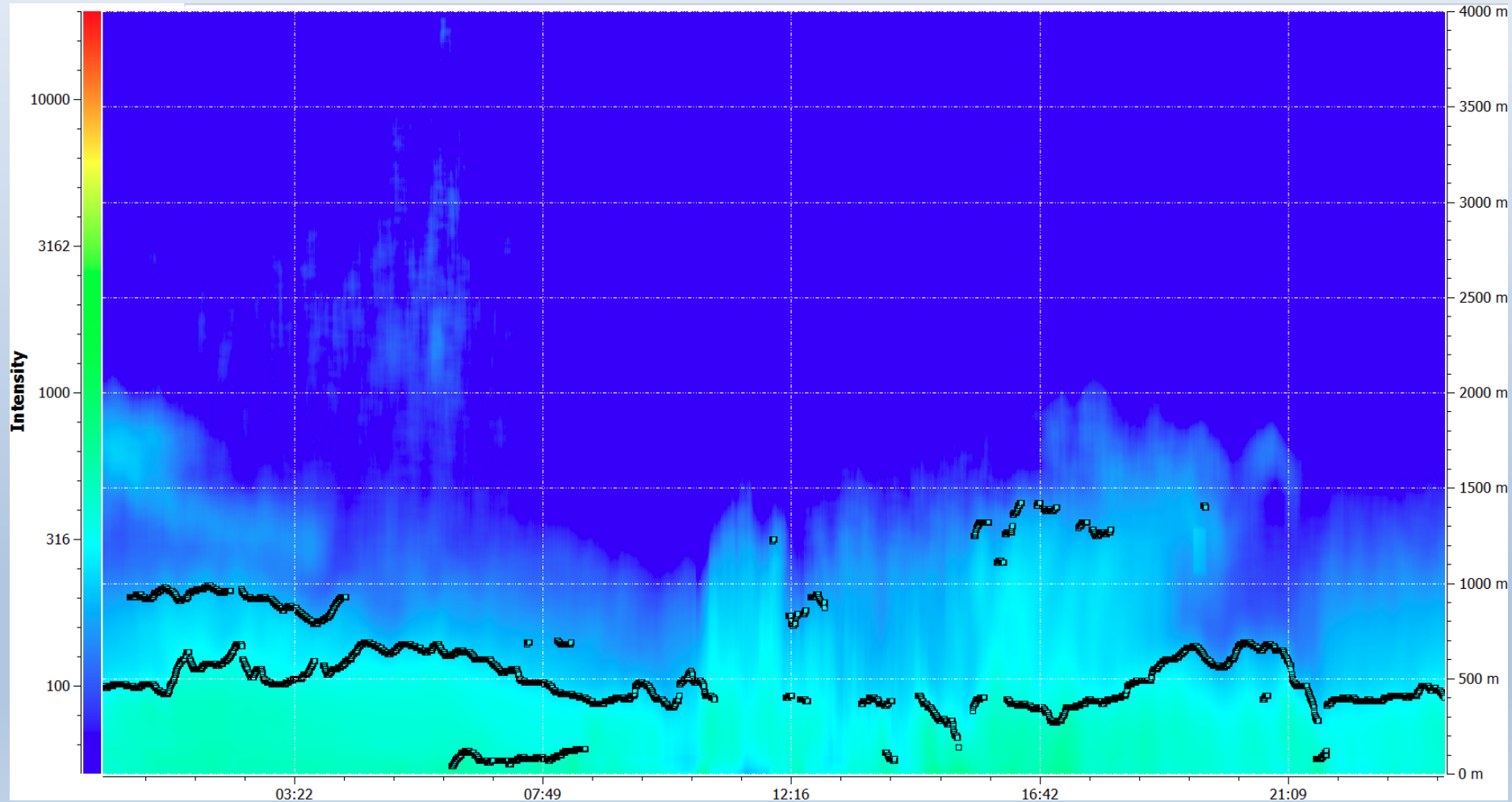
Map Source: (AirNow.gov)

<http://airnow.gov/index.cfm?action=airnow.mapsarchivecalendar>

Santa Clarita Vaisala CL-51 Ceilometer

July 22, 2016

(Sand Fire Started in Afternoon)



Morning sun over Pasadena, Saturday, July 23





A cloud of smoke from the Santa Clarita fire is seen over Los Angeles International Airport, in Los Angeles, California, July 23, 2016.

Getty / Valeria Macon

<http://www.popularmechanics.com/science/environment/news/g2716/apocalyptic-pictures-california-sand-fire/?slide=11>

Sand Fire
Saturday Morning
July 23, 2016
MODIS Terra Image

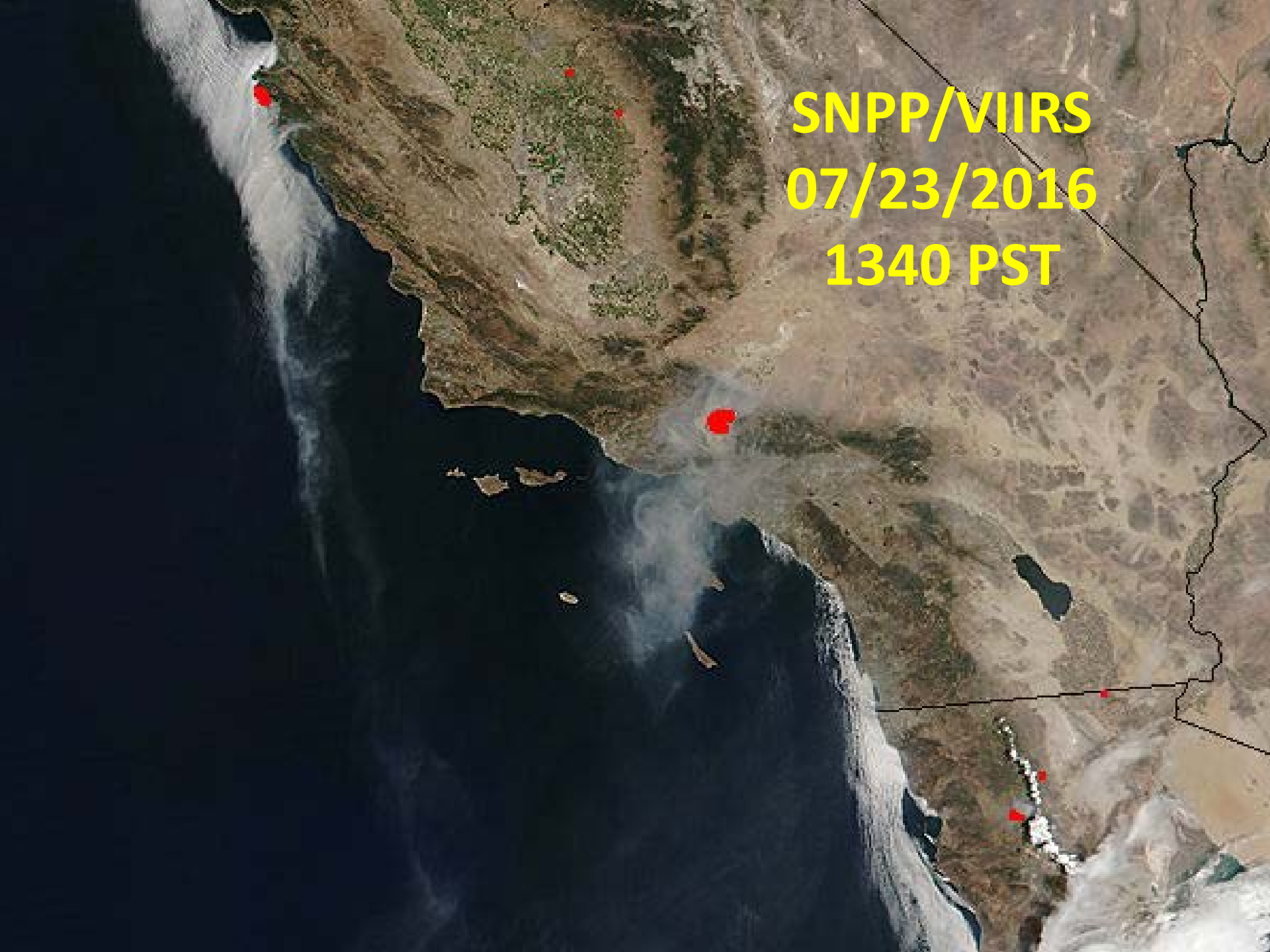


Los Angeles

Smoke



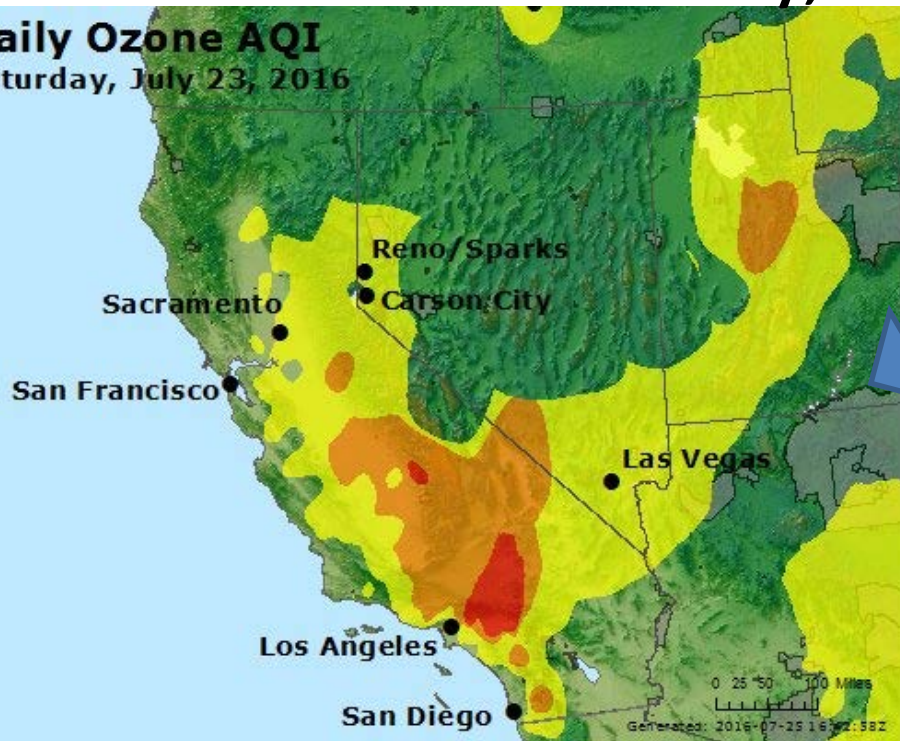
SNPP/VIIRS
07/23/2016
1340 PST



Daily Max Ozone and PM AQI

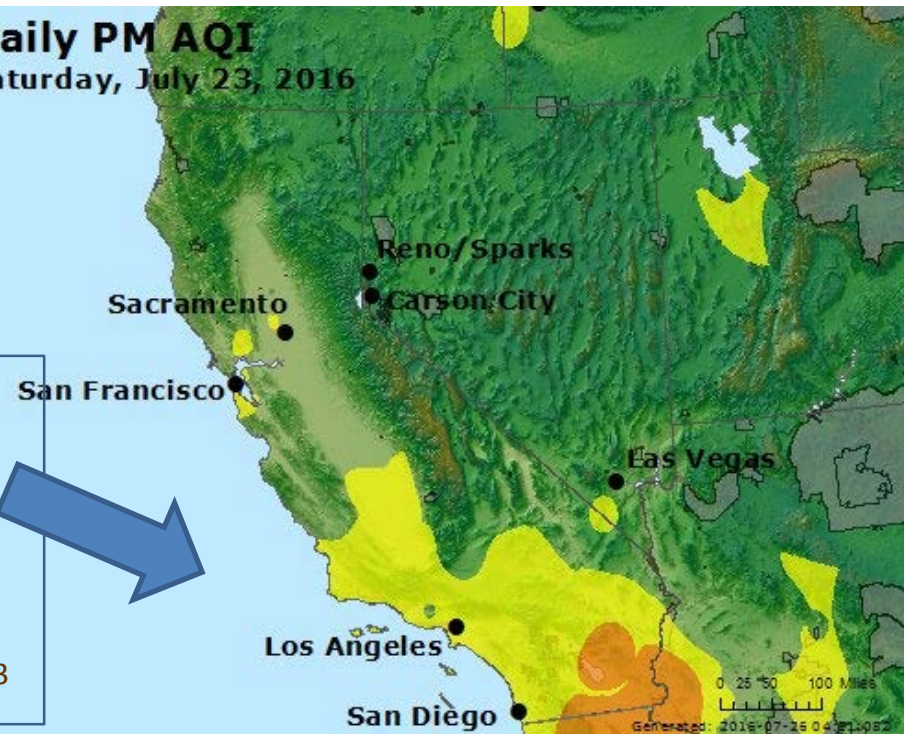
Saturday, July 23, 2016

Daily Ozone AQI
Saturday, July 23, 2016



Peak 8-hour Ozone = 101 ppb
(190 AQI = Unhealthy for Sensitive Groups)
in San Bernardino
Peak 1-hour Ozone = 132 ppb in Upland

Daily PM AQI
Saturday, July 23, 2016



Santa Clarita Peak 24-hour PM2.5 = 60 $\mu\text{g}/\text{m}^3$???
Basin Peak 24-hour PM2.5 = 28.8 $\mu\text{g}/\text{m}^3$
(86 AQI = Moderate in West San Fernando Valley)
Santa Clarita Peak 1-Hour PM2.5 = 880 $\mu\text{g}/\text{m}^3$???
Reseda Peak 1-Hour PM2.5 = 59 $\mu\text{g}/\text{m}^3$
Central Los Angeles Peak 1-Hour PM2.5 = 30 $\mu\text{g}/\text{m}^3$

Map Source: (AirNow.gov)

<http://airnow.gov/index.cfm?action=airnow.mapsarchivecalendar>

Sand Fire Days 1-3

RESE - FEM - P25B [3] (ug/m3) - 24 Hr Rolling Av

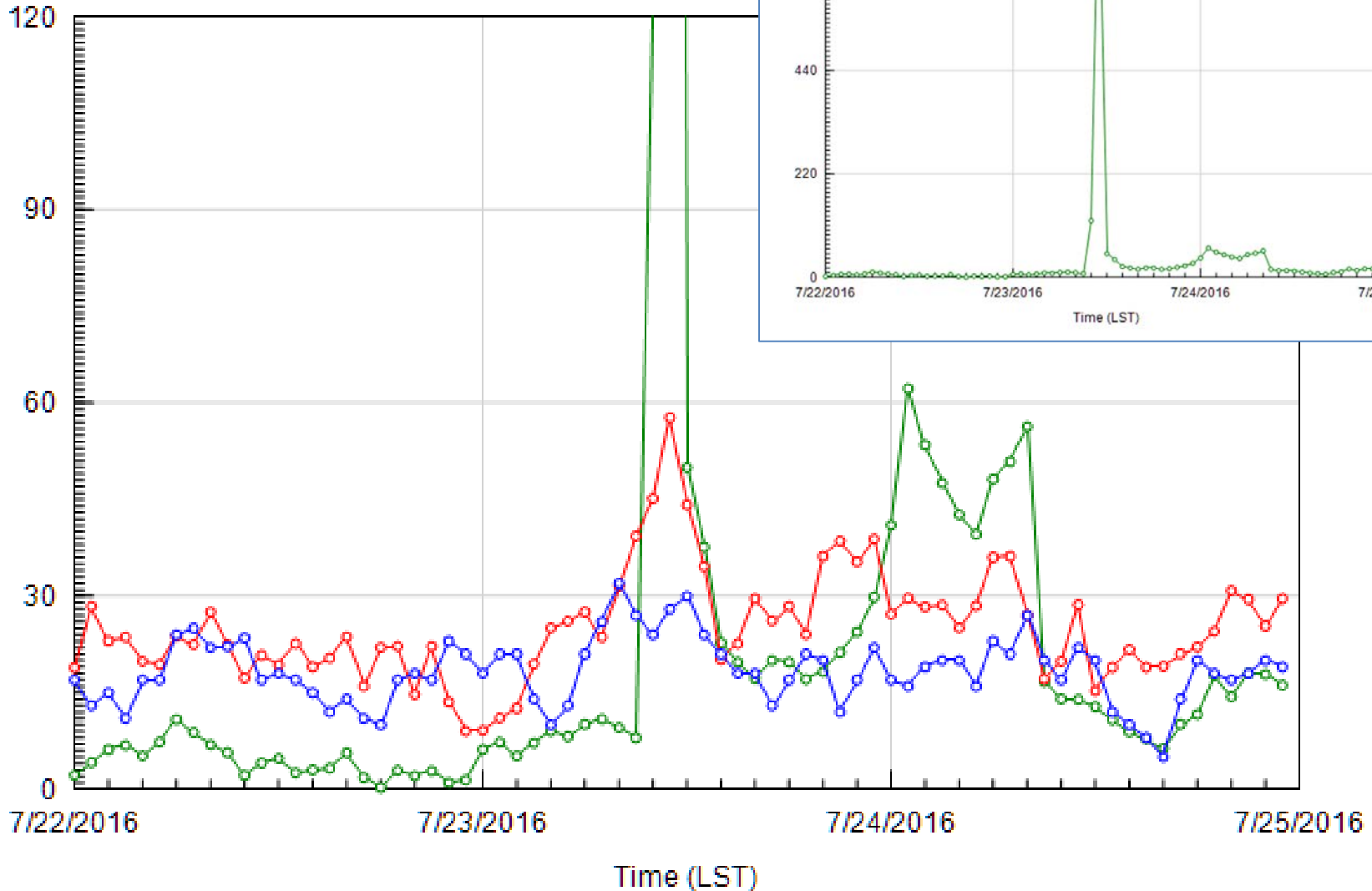
SCLR - FEM - P25B [3] (ug/m3) - 24 Hr Rolling Av

CELA - NCORE PM2.5 [9] (ug/m3_LC) - 24 H

○ CELA - NCORE PM2.5 [9] (ug/m3_LC) - 1 Hr

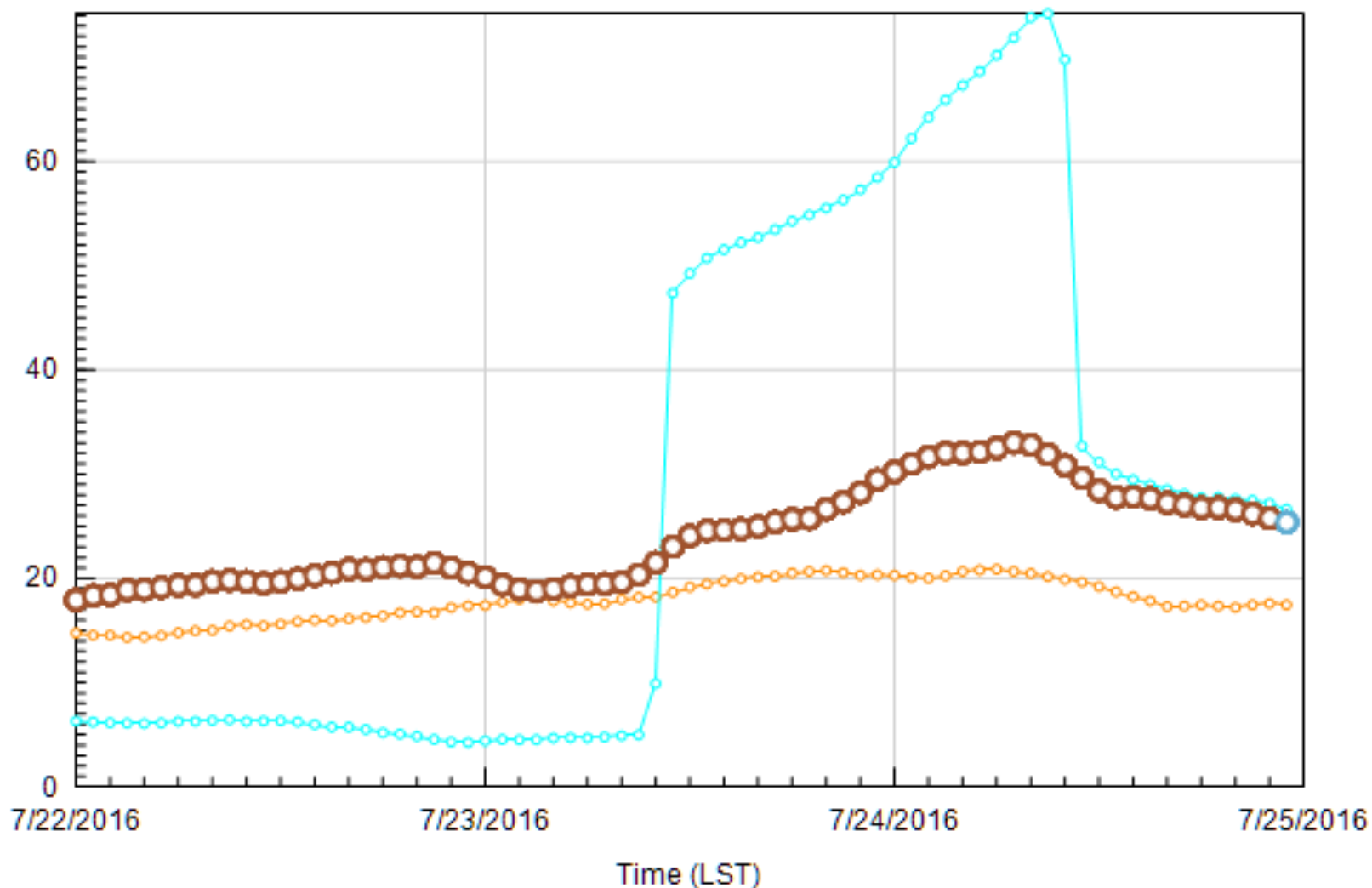
○ RESE - FEM - P25B [3] (ug/m3) - 1 Hr

○ SCLR - FEM - P25B [3] (ug/m3) - 1 Hr

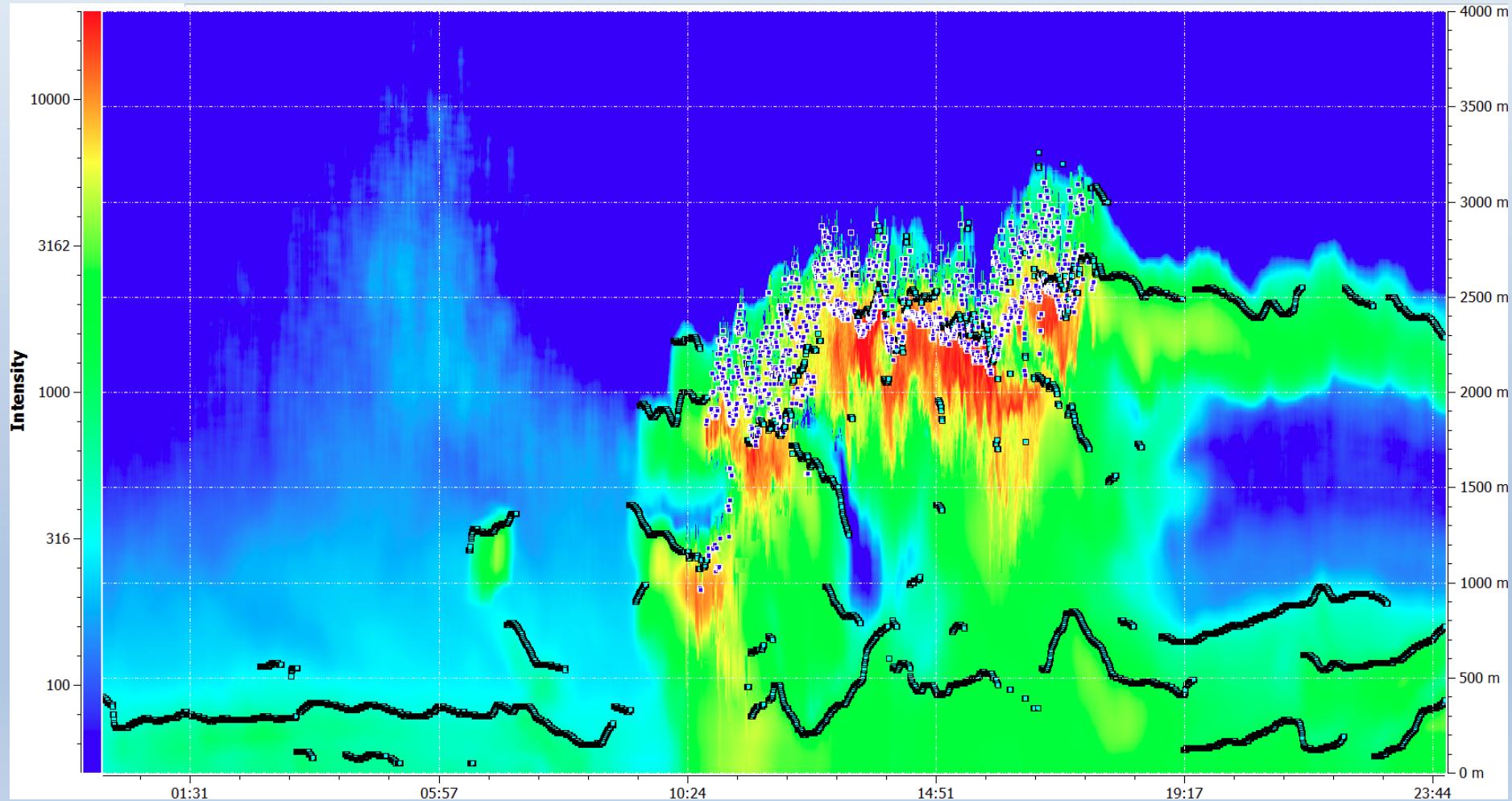


Sand Fire Days 1-3

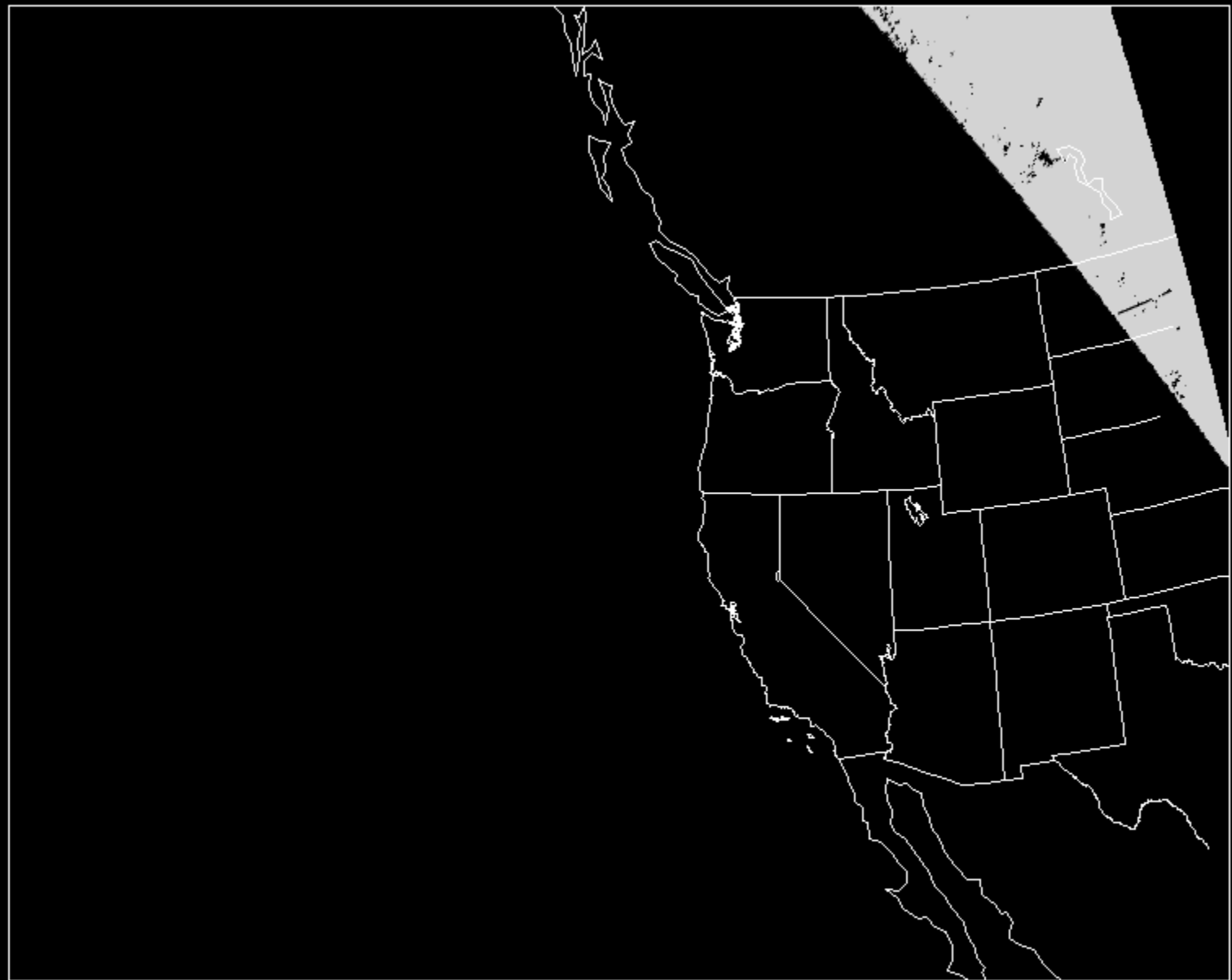
- RESE - FEM - P25B [3] (ug/m3) - 24 Hr Rolling Avg
- SCLR - FEM - P25B [3] (ug/m3) - 24 Hr Rolling Avg
- CELA - NCORE PM2.5 [9] (ug/m3_LC) - 24 Hr Rolling Avg
- CELA - NCORE PM2.5 [9] (ug/m3_LC) - 1 Hr
- RESE - FEM - P25B [3] (ug/m3) - 1 Hr
- SCLR - FEM - P25B [3] (ug/m3) - 1 Hr



Santa Clarita Ceilometer July 23, 2016 (Smoke from Sand Fire)



GASP WEST AOD 2016 07 23 1115 UTC



0.0 0.2 0.4 0.6 0.8 1.0

AOD

0.0 0.1 0.2 0.3 0.4

Ch1 reflectance

VIIRS RGB and EDR AOT high quality

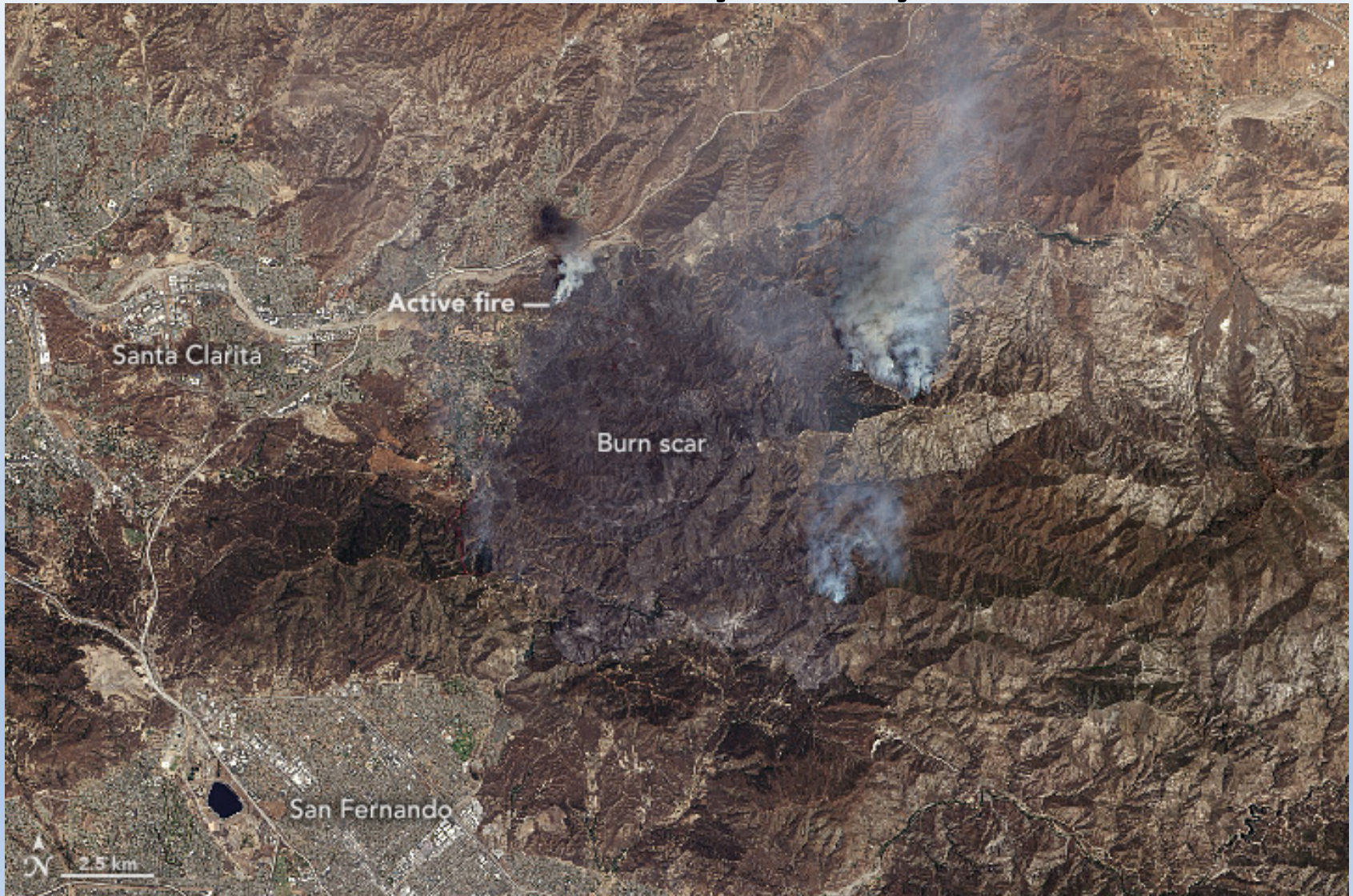
July 23, 2016

http://www.star.nesdis.noaa.gov/smcd/spb/aq/index.php?plot_type=VIIRS_google&product_date=20160723&product_gmt=&product_id=4&zoom=7&lat0=34.56971005849016&lon0=-116.77479103207588&aotqual=0&aotopacity=100&fire=0&dust=0

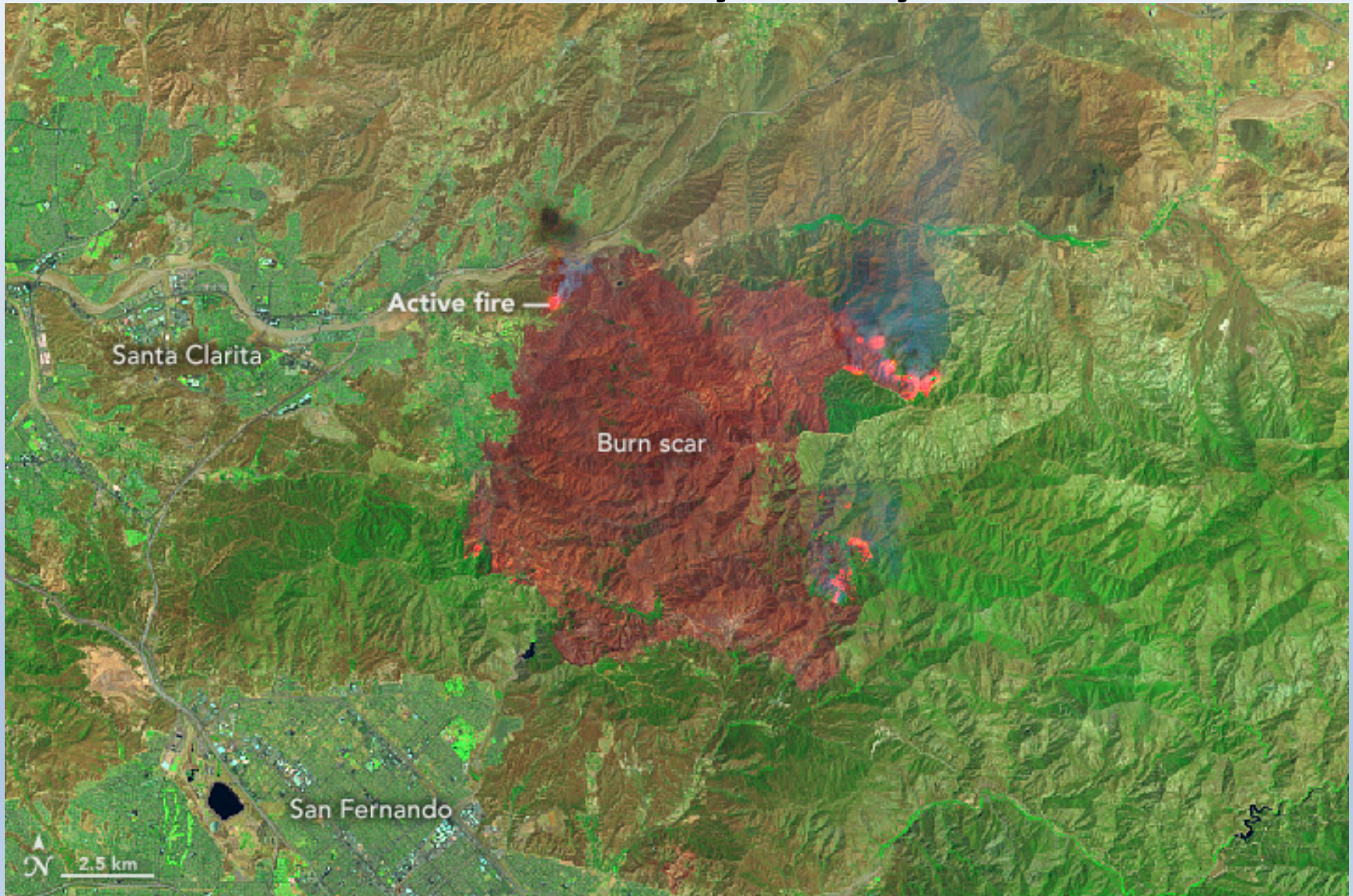
eIDEA:

http://www.star.nesdis.noaa.gov/smcd/spb/aq/expr/expr2/index.php?goto_date=20160723&plot_sel=6&zoom=6&lat0=32.5537046148233&lon0=-119.345947265625&smksel=1&smkopacity=100&fire=1&airnow=0&labels=1&county=0

Sand Fire, Sunday, July 24, 2016



Sand Fire, Sunday, July 24, 2016



**July 24, 2016 2120 UTC
(Suomi NPP Satellite,
VIIRS Instrument)**

Fresno

Monterey

Soberanes Fire

**Soberanes Fire: 14,897
Acres, 5% containment;
near Big Sur; Started in the
morning of July 22 and
grew to over 106,000 acres
with 60% containment by
9/12/16**

Bakersfield

**Sand Fire: 33,117 Acres,
10% containment**

Sand Fire

Angeles
National Forest

Pacific
Ocean

**Sand Fire Day Four
July 25**

Hotspots



A satellite image of California from the MODIS Aqua satellite. The image shows the state's coastline on the left, with the Pacific Ocean. The land is colored in shades of brown and tan, indicating vegetation and land cover. There are several red markers on the image: one in the top left corner, and two in the bottom right corner. The text 'MODIS Aqua 07/26/2016 1300 PST' is overlaid in yellow in the upper right quadrant.

MODIS Aqua
07/26/2016
1300 PST

https://lance.modaps.eosdis.nasa.gov/cgi-bin/imagery/single.cgi?image=California_A2016208.2100.1km.jpg

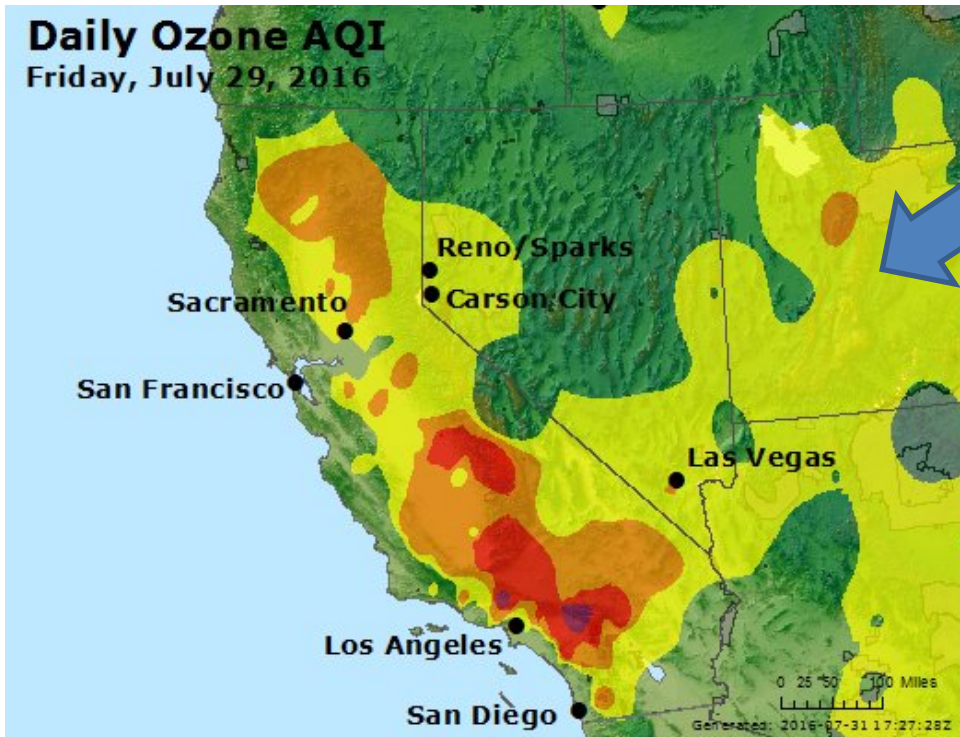
Meanwhile ... on July 29, 2016

MORE OZONE

Daily Max Ozone and PM AQI

Friday, July 29, 2016

Peak 8-hour Ozone = 121 ppb
(217 AQI = Very Unhealthy)
in the Central San Bernardino Mountains
South Coast Basin Max for Year (so far)
Peak 1-hour Ozone = 147 ppb
in Metropolitan San Bernardino

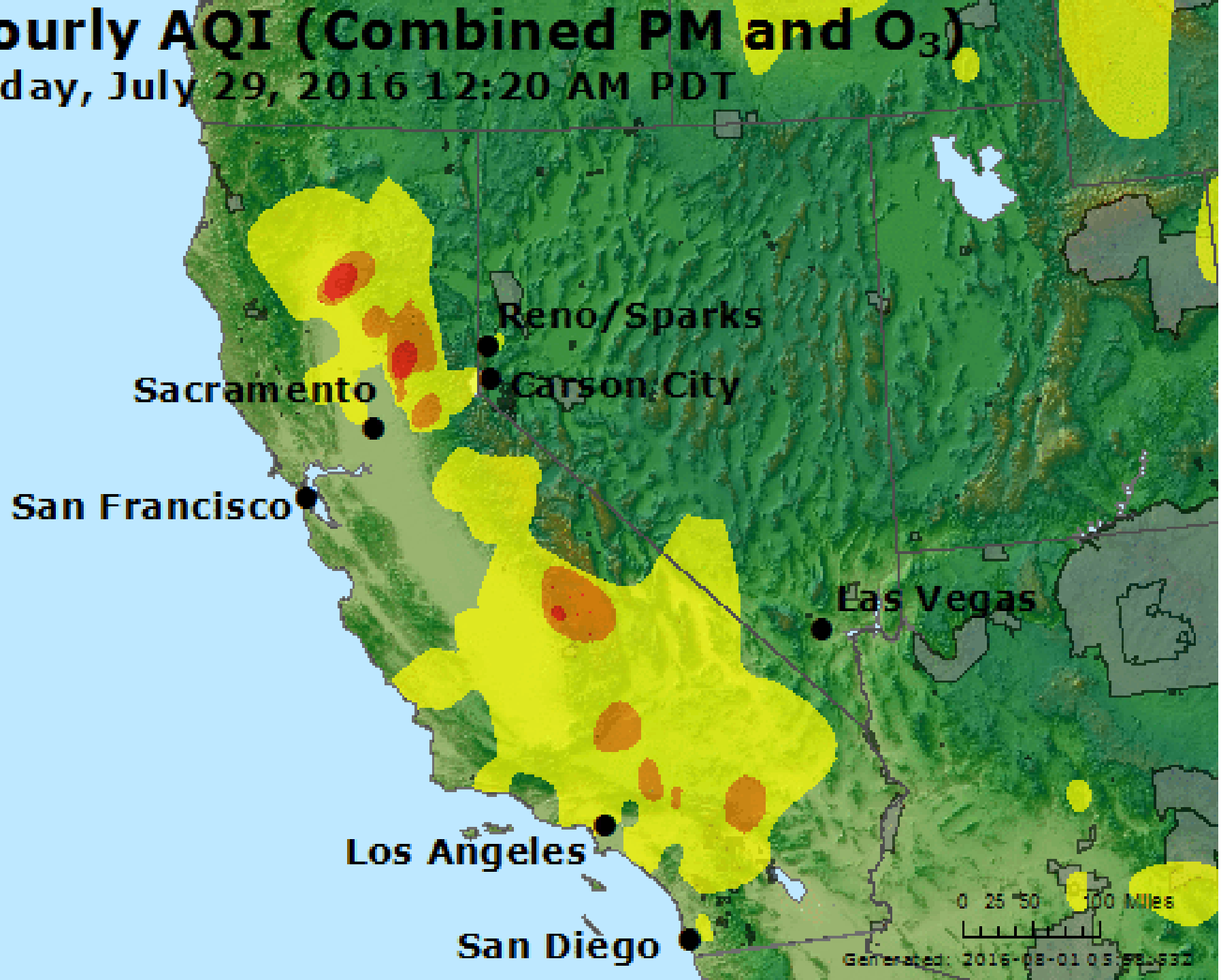


Friday Morning, July 29, 2016
MODIS Aqua Image



Hourly AQI (Combined PM and O₃)

Friday, July 29, 2016 12:20 AM PDT



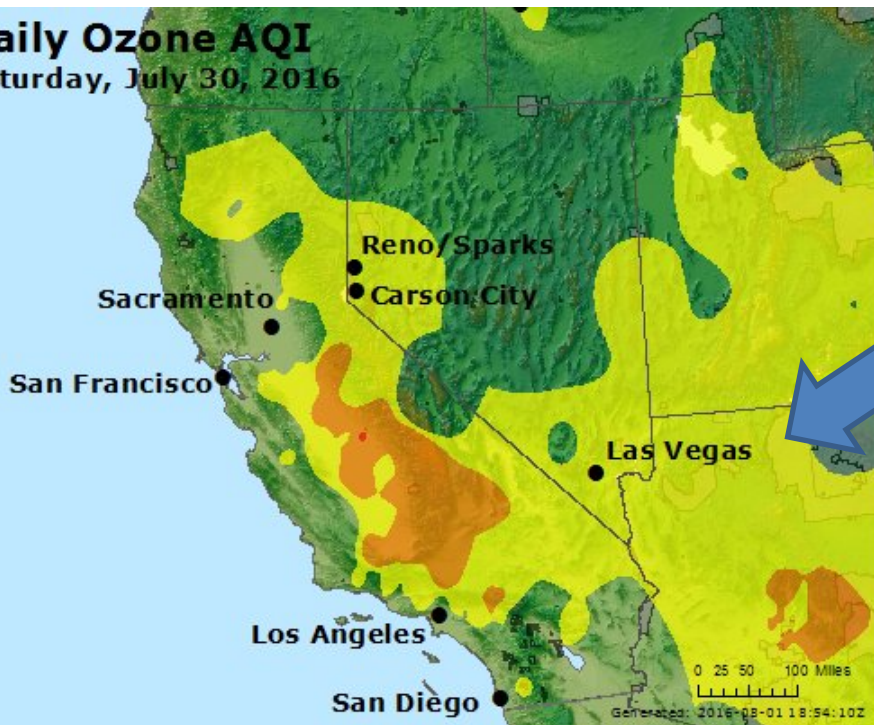
Not to be left out ... on July 30, 2016

WINDBLOWN DUST EVENT

Daily Max Ozone and PM AQI

Saturday, July 30, 2016

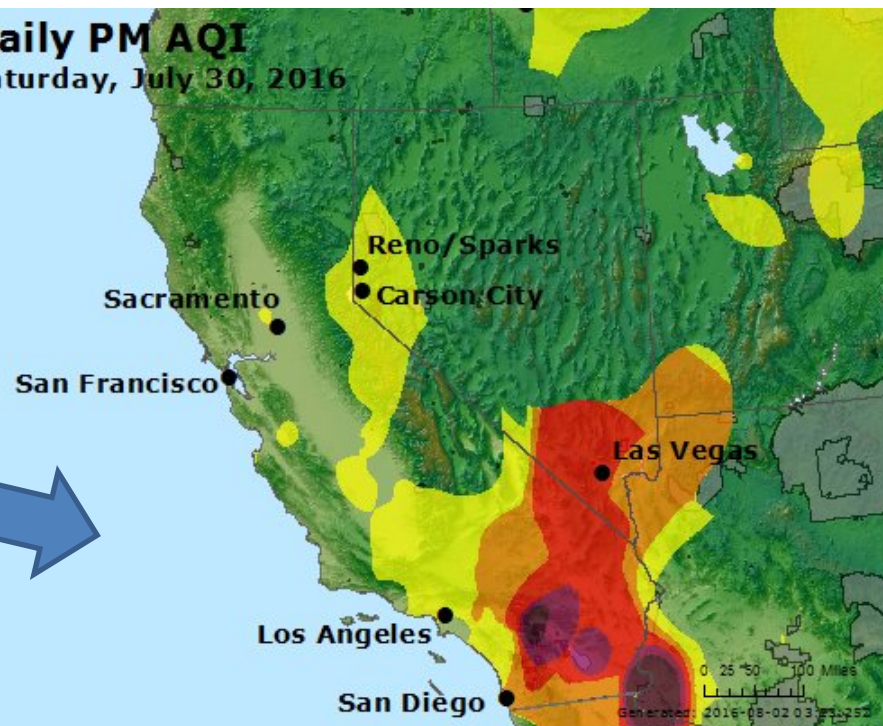
Daily Ozone AQI
Saturday, July 30, 2016



Peak 8-hour Ozone = 77 ppb
(122 AQI = Unhealthy for Sensitive Groups)
in the Central San Bernardino Mountains
Peak 1-hour Ozone = 88 ppb
in Central San Bernardino Mountains

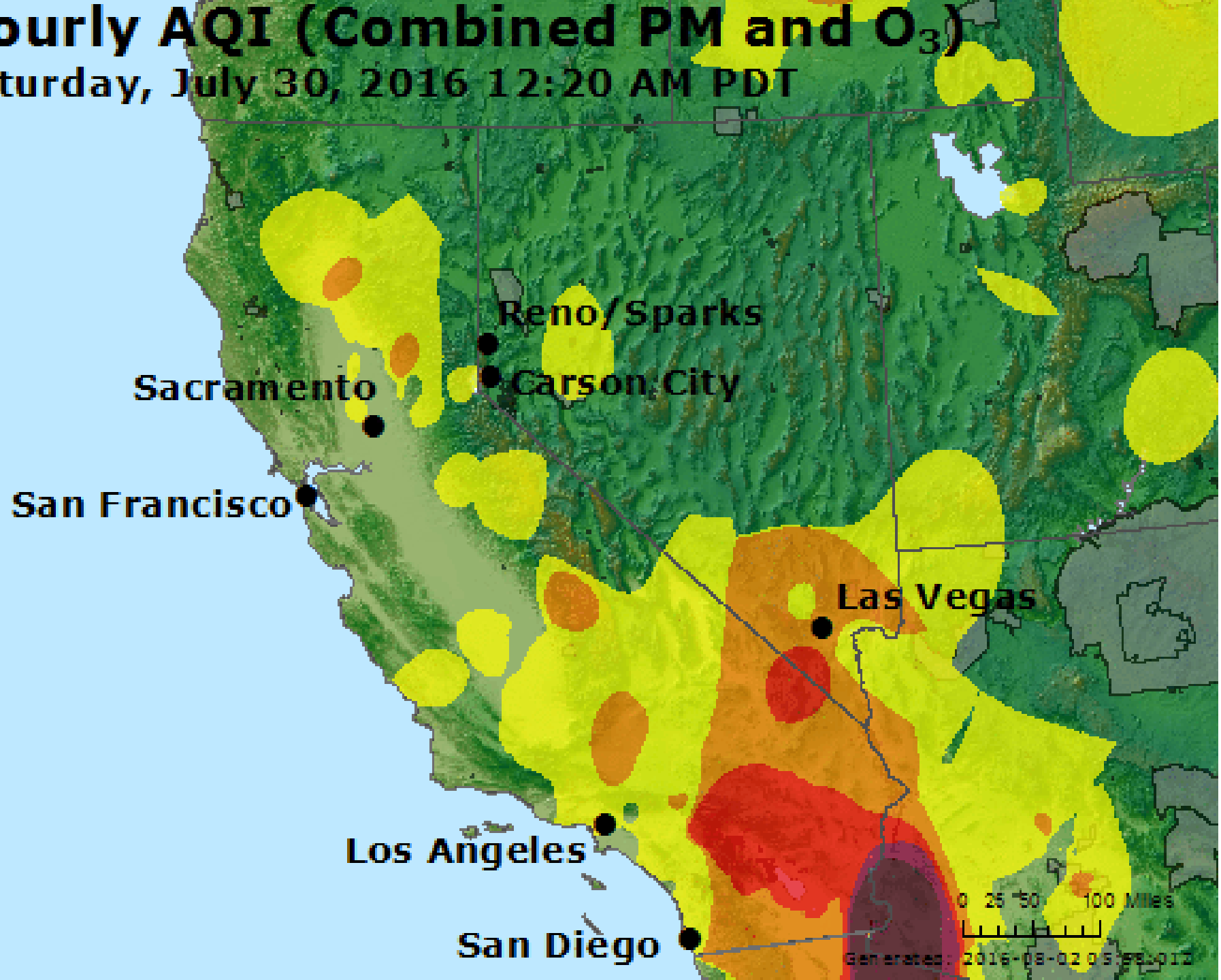
Peak 24-hour PM10= 468 $\mu\text{g}/\text{m}^3$
(355 AQI = Hazardous)
in Mecca (Coachella Valley)

Daily PM AQI
Saturday, July 30, 2016



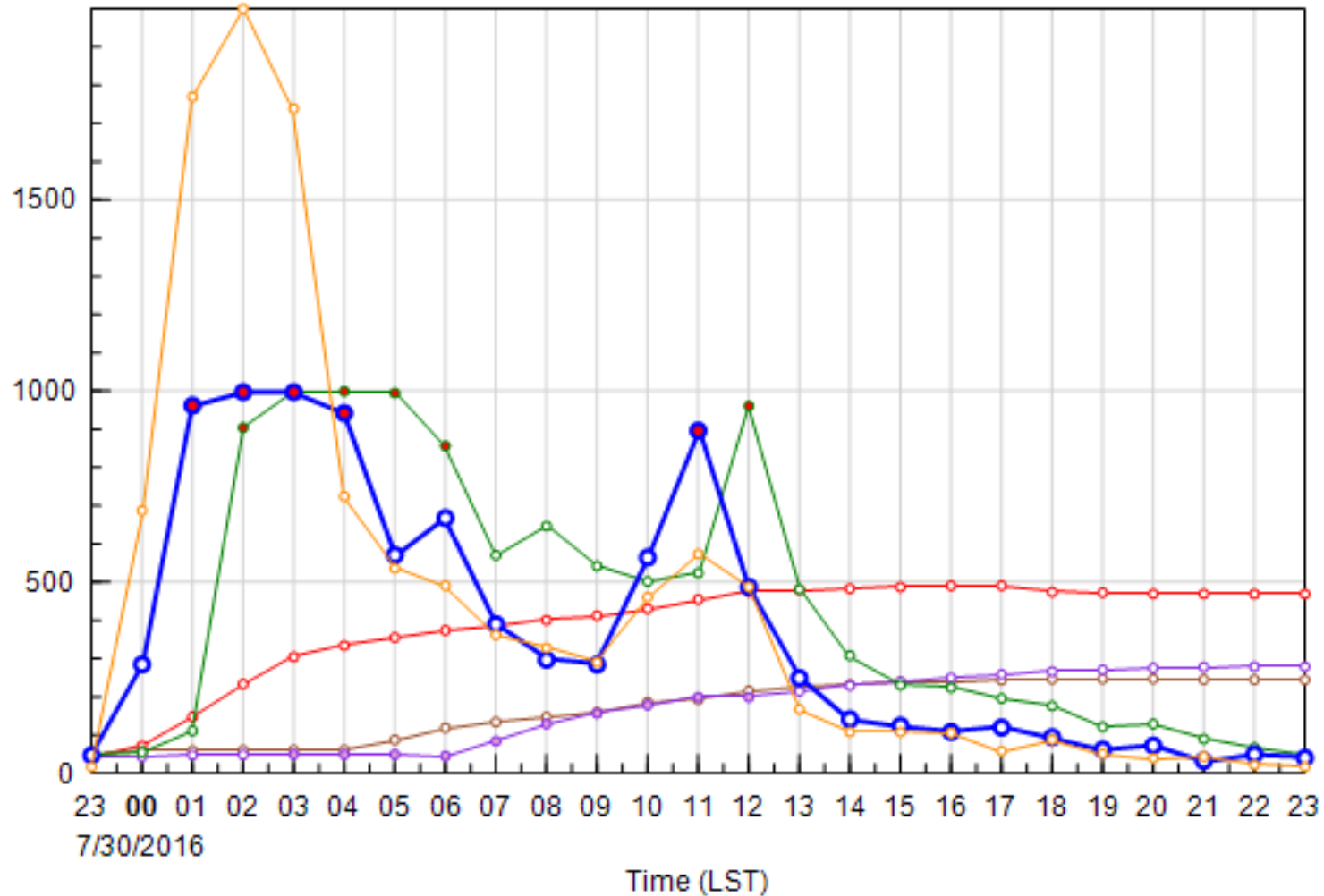
Hourly AQI (Combined PM and O₃)

Saturday, July 30, 2016 12:20 AM PDT



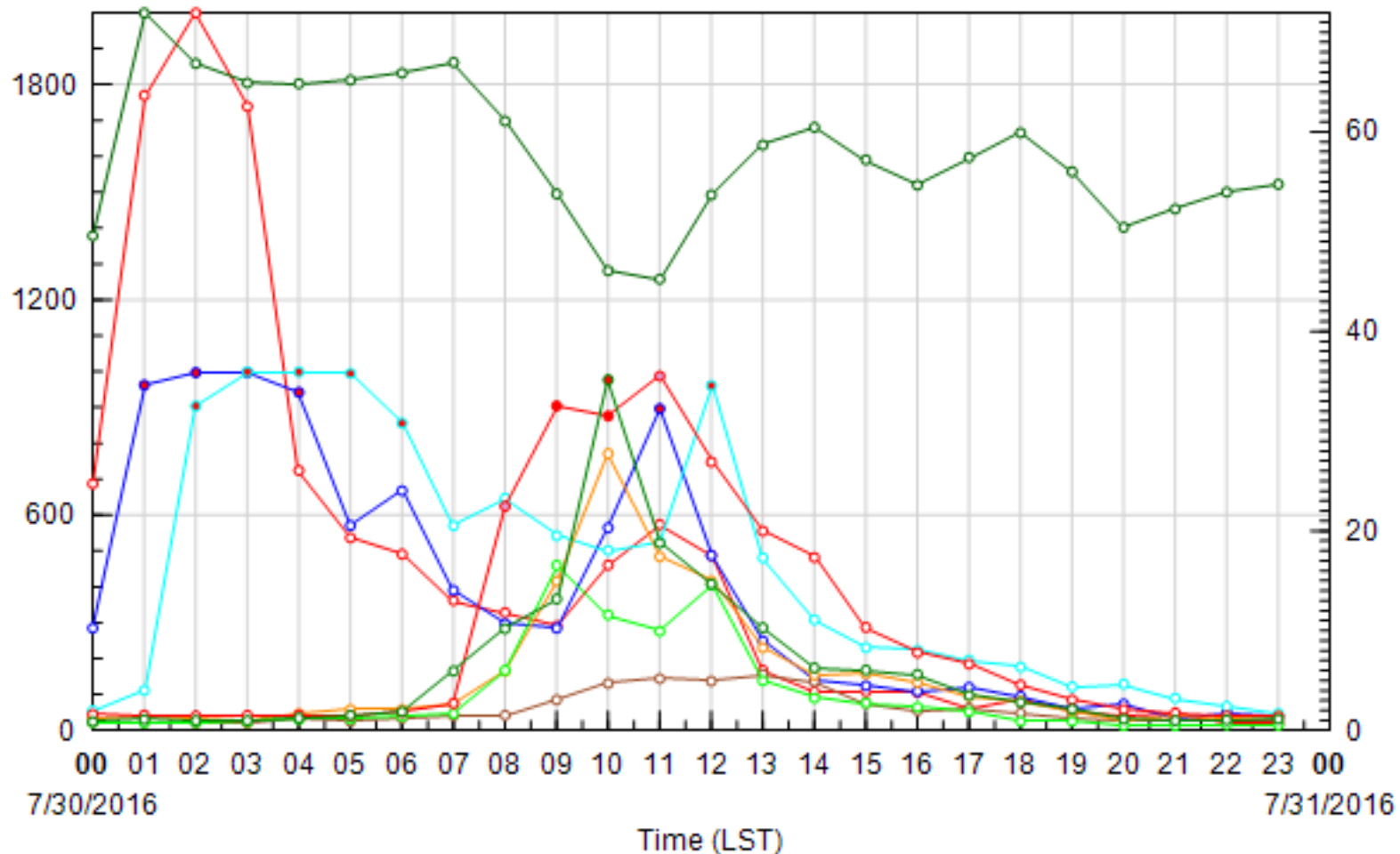
CV PM10 24-hour Running & Hrly

- SLMZ - FEM - P10T [3] (ug/m3) - 1 Hr
- **INDI - FEM - P10T [3] (ug/m3) - 1 Hr**
- PLSP - FEM - P10T [3] (ug/m3) - 1 Hr
- PLSP - FEM - P10T [3] (ug/m3) - 24 Hr Rolling Avg
- INDI - FEM - P10T [3] (ug/m3) - 24 Hr Rolling Avg
- SLMZ - FEM - P10T [3] (ug/m3) - 24 Hr Rolling Avg



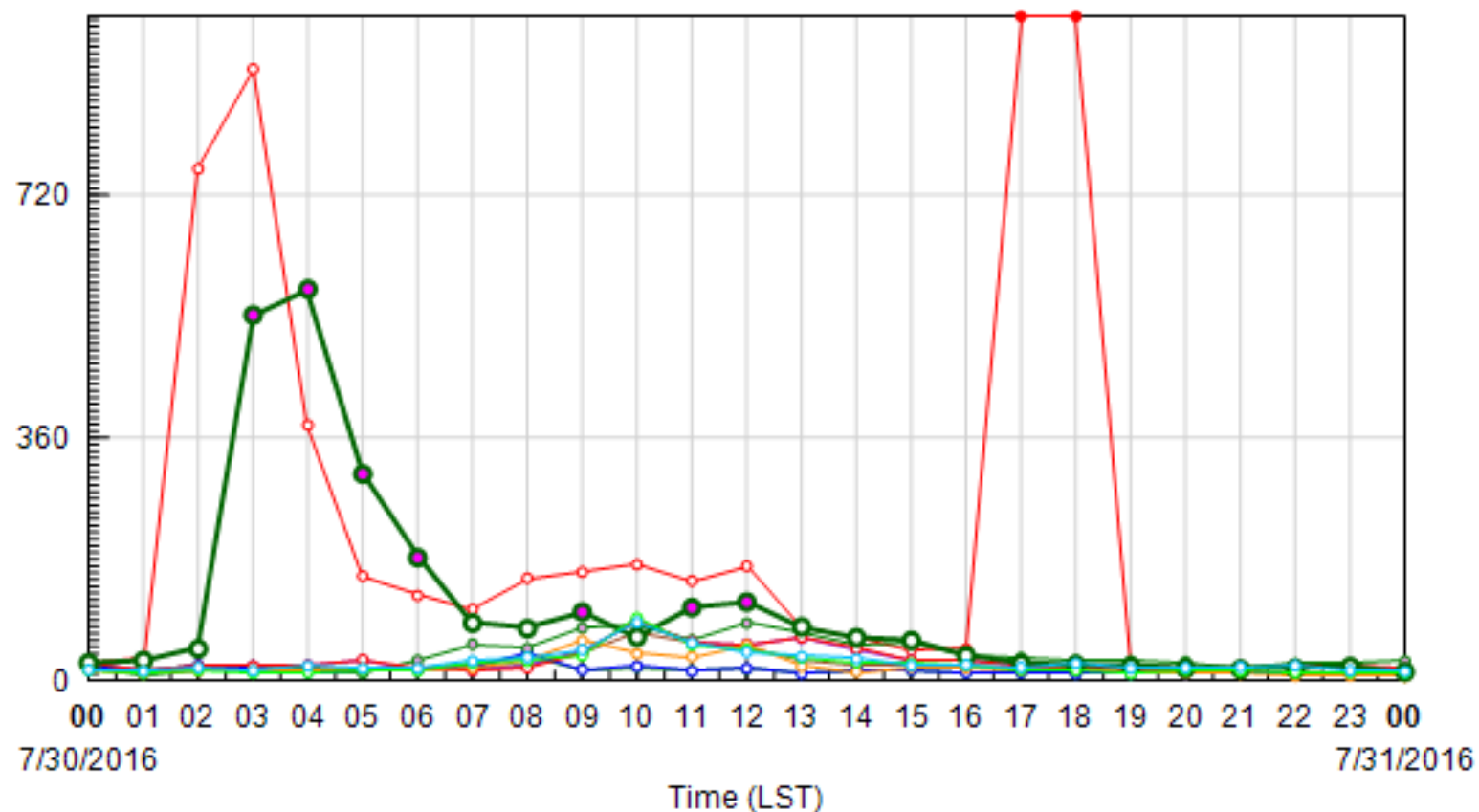
CV and Basin Thunderstorm Dust Event

- RIVR - NCORE PM10 [9] (ug/m3_LC) - 1 Hr
- SNBO - FEM - P10T [3] (ug/m3) - 1 Hr
- ELSI - FEM - P10T [3] (ug/m3) - 1 Hr
- MLVB - FEM - P10B [3] (ug/m3) - 1 Hr
- DRTE - FEM - P10B (ug/m3) - 1 Hr
- PLSP - FEM - P10T [3] (ug/m3) - 1 Hr
- INDI - FEM - P10T [3] (ug/m3) - 1 Hr
- SLMZ - FEM - P10T [3] (ug/m3) - 1 Hr
- PLSP - RH (%) - 1 Hr



CV and Basin Thunderstorm Dust Event PM2.5

- RIVR - Non-FEM P25C [3] (ug/m3) - 1 Hr
- RIVR - NCORE PM2.5 [9] (ug/m3_LC) - 1 Hr
- **BNAP - Non-FEM_PM2.5_AV [3] (ug/m3_LC) - 1 Hr**
- ELSI - Non-FEM_PM2.5_AV [3] (ug/m3_LC) - 1 Hr
- SCLR - Non-FEM 2.5 Avg. [3] (ug/m3_LC) - 1 Hr
- CRES - Non-FEM 2.5 Avg. [3] (ug/m3_LC) - 1 Hr
- TMCA - Non-FEM 2.5 Avg. [3] (ug/m3_LC) - 1 Hr
- SCLR - FEM - P25B [3] (ug/m3) - 1 Hr
- MLVB - FEM - P25B [3] (ug/m3) - 1 Hr
- DHSP - FEM - P25B [3] (ug/m3) - 1 Hr
- TMCA - FEM - P25B [3] (ug/m3) - 1 Hr



Dust Events

Looking for the ‘smoking gun’ for Windblown Dust Exceptional Event Analyses

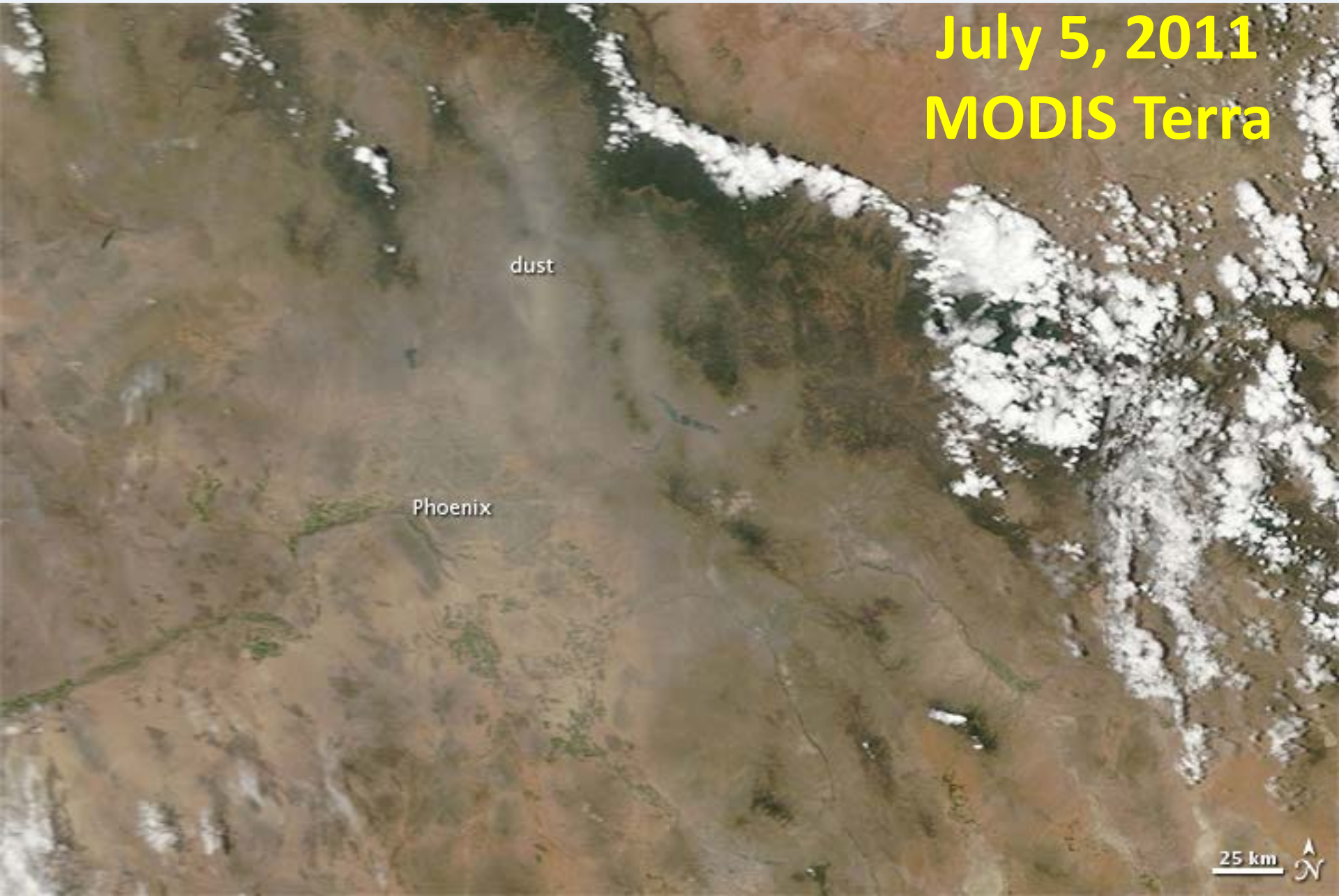
Phoenix Haboob, July 5, 2011



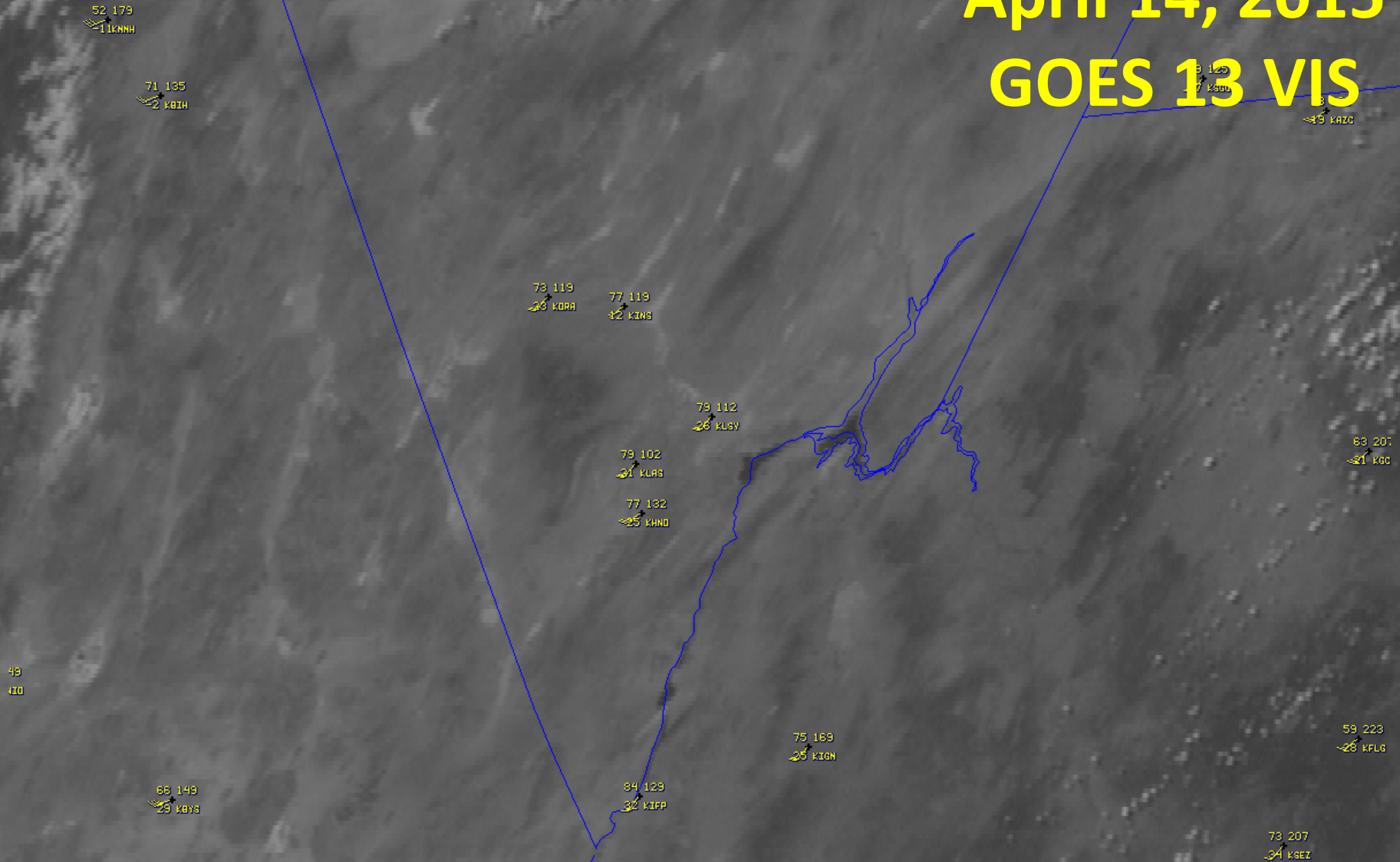
<https://youtu.be/8W4Cx44XKZ4>

...Sometimes more subtle evidence

July 5, 2011
MODIS Terra



April 14, 2015 GOES 13 VIS



http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2015/04/150414_goes13_visible_obs_dust_storm_NV_anim.mp4

SURFACE OBSERVATIONS - 18 UTC

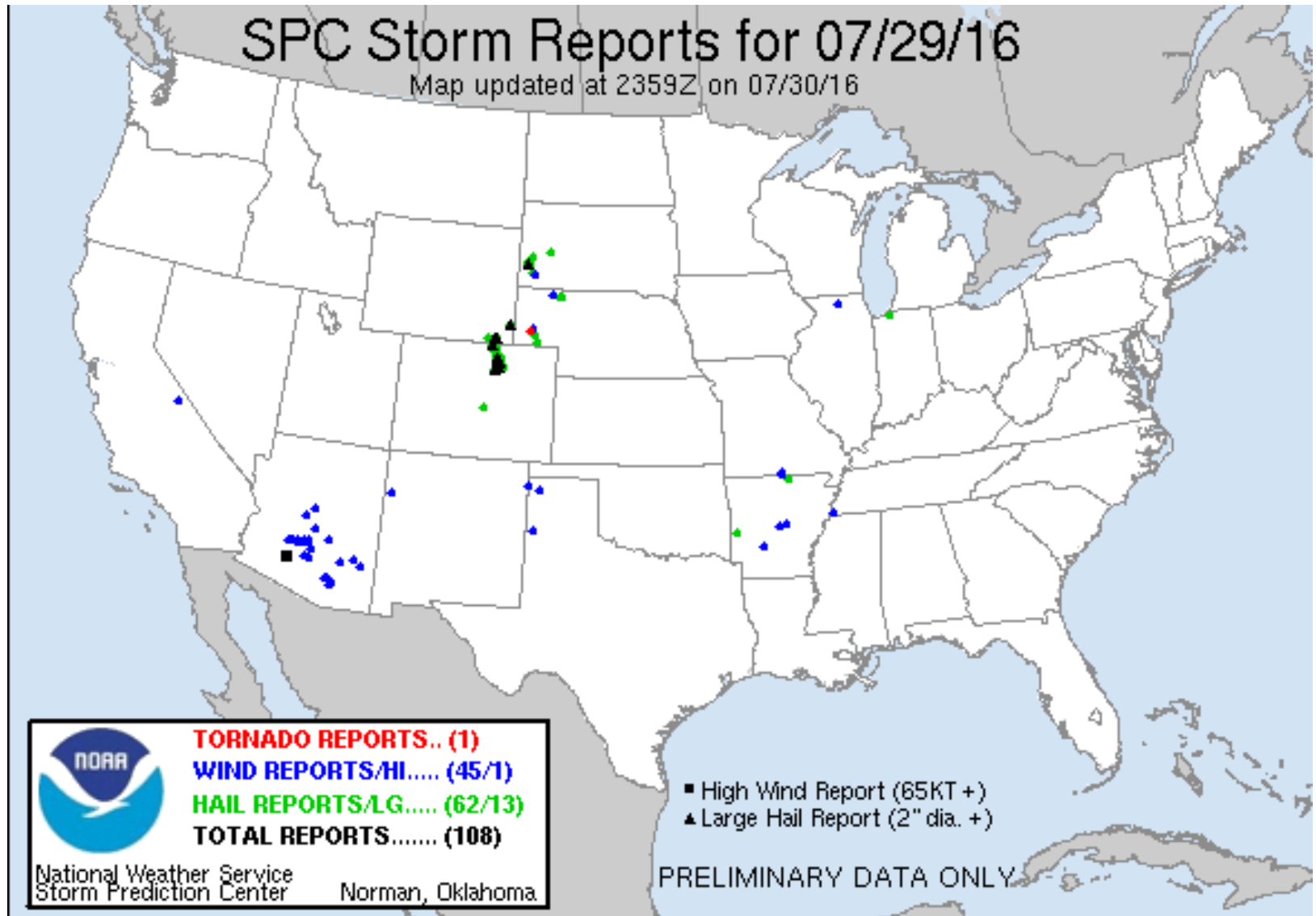
Haboob Photo Pinal County, AZ

July 20, 2016



http://www.trivalleycentral.com/gallery/news/massive-dust-storm-blows-through-pinal/collection_9f0e85be-5675-11e6-bb96-378e4123ab2b.html

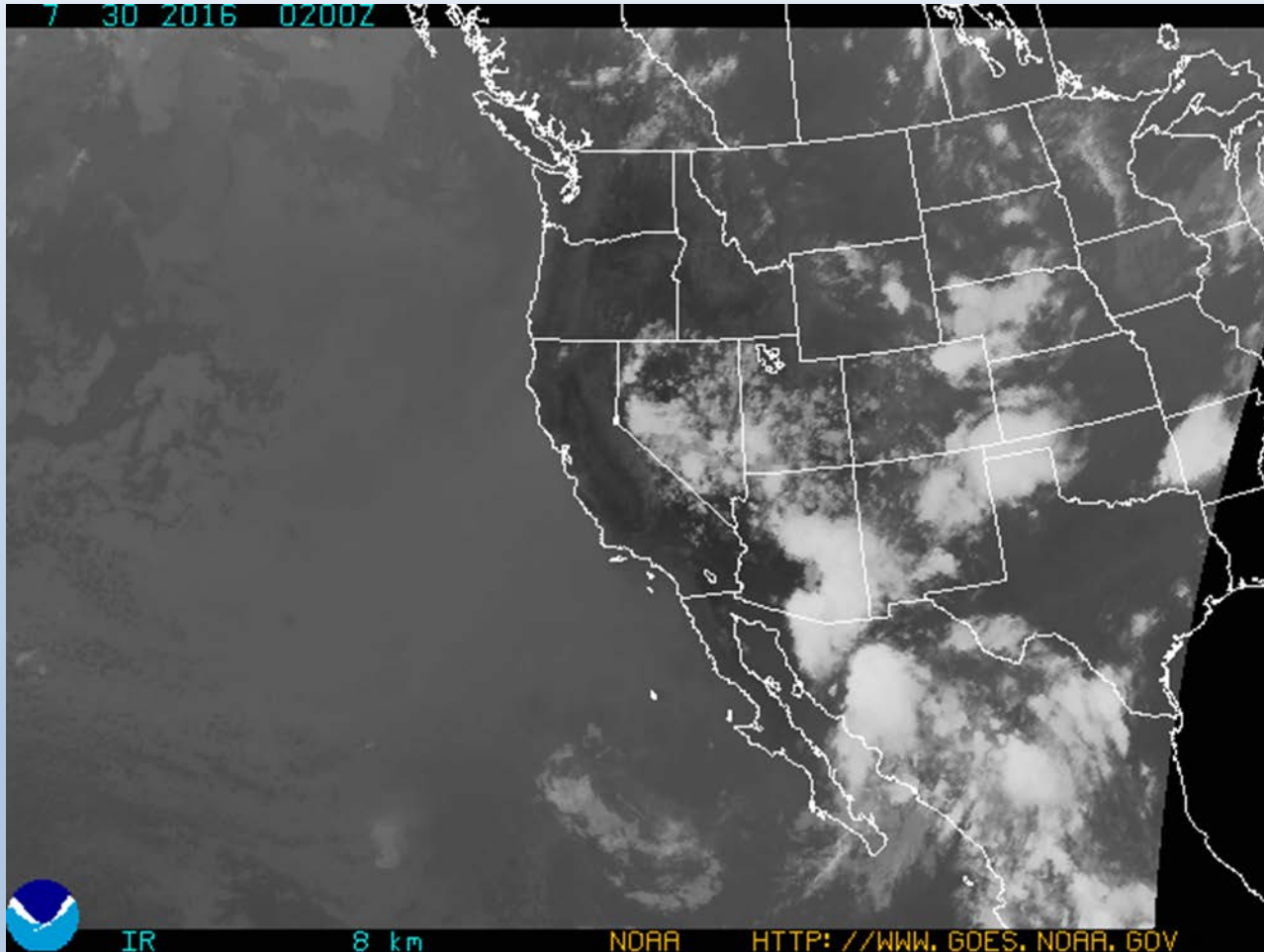
Storm Reports



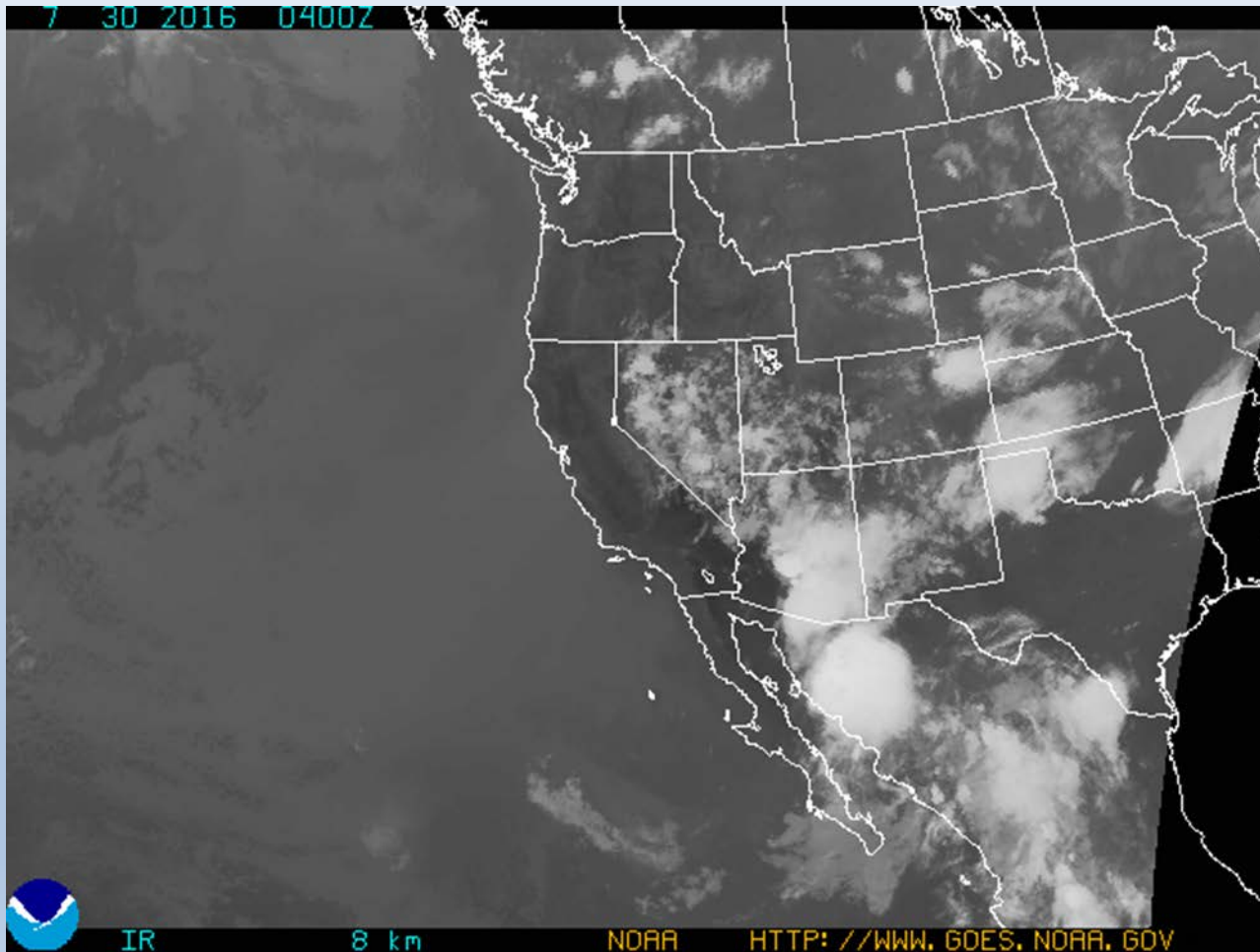
July 29-30, 2016

GOES WEST IR 'LOOP'

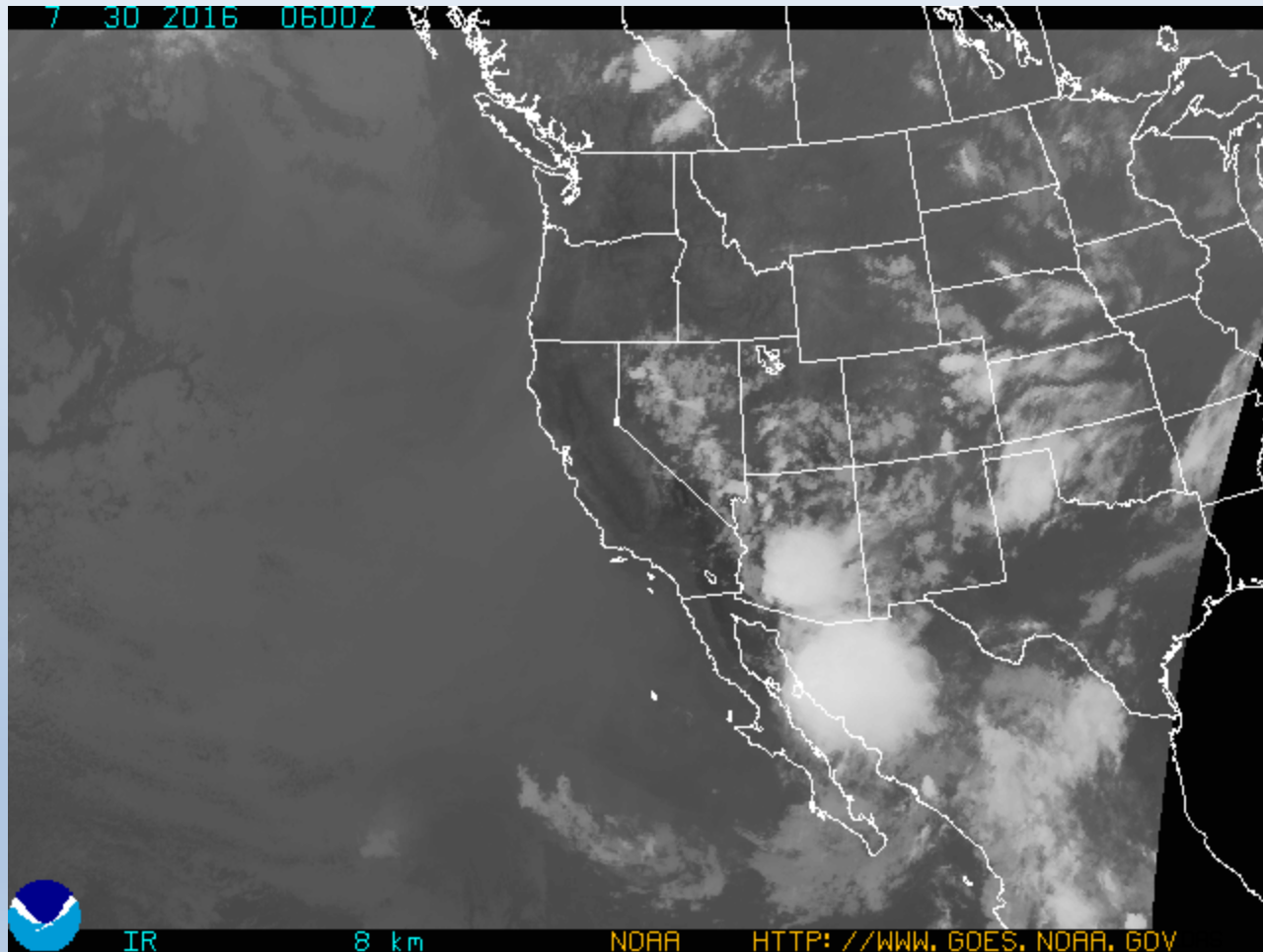
GOES-W IR, July 29, 2016, 1800 PST



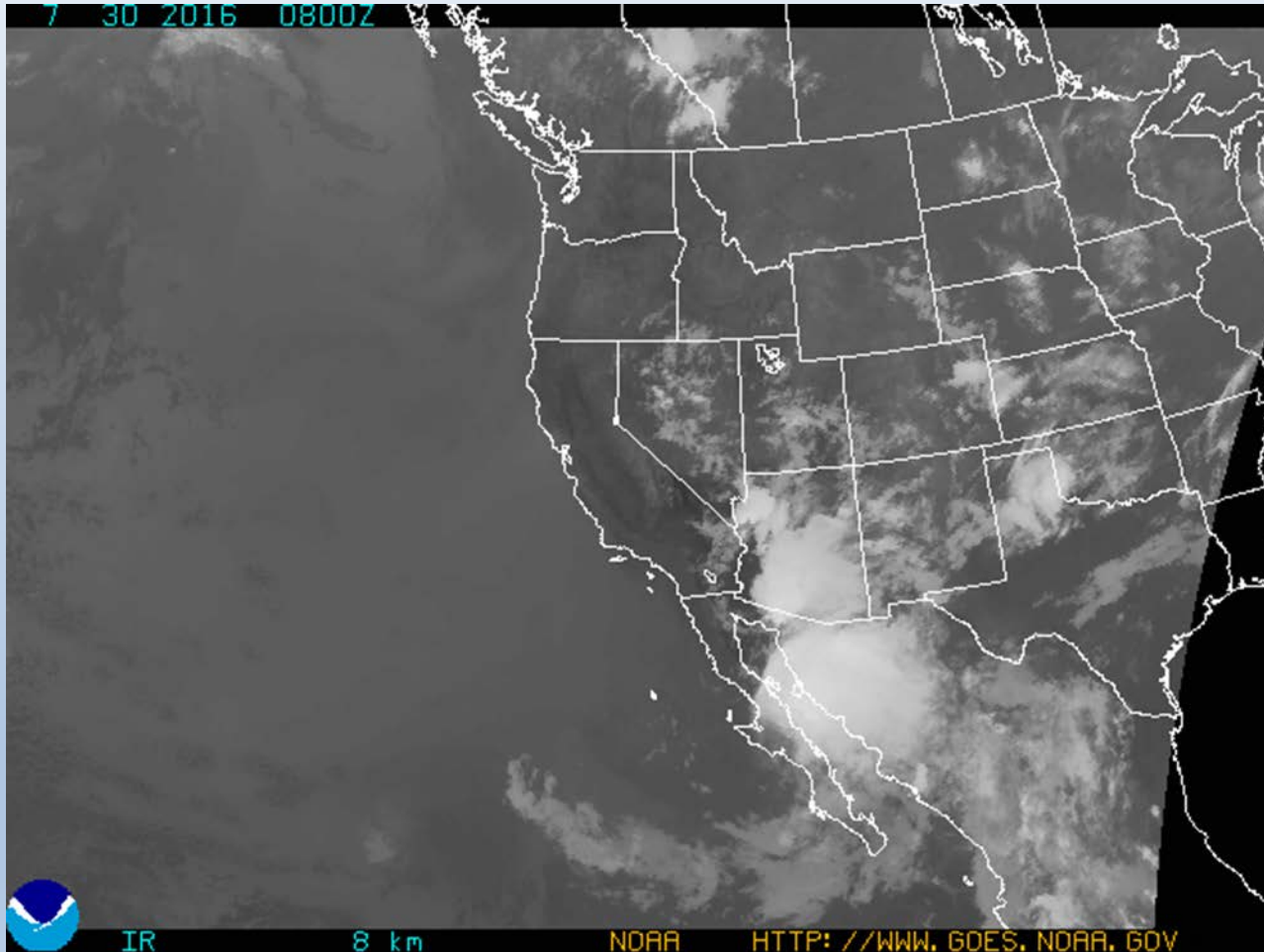
GOES-W IR, July 29, 2016, 2000 PST



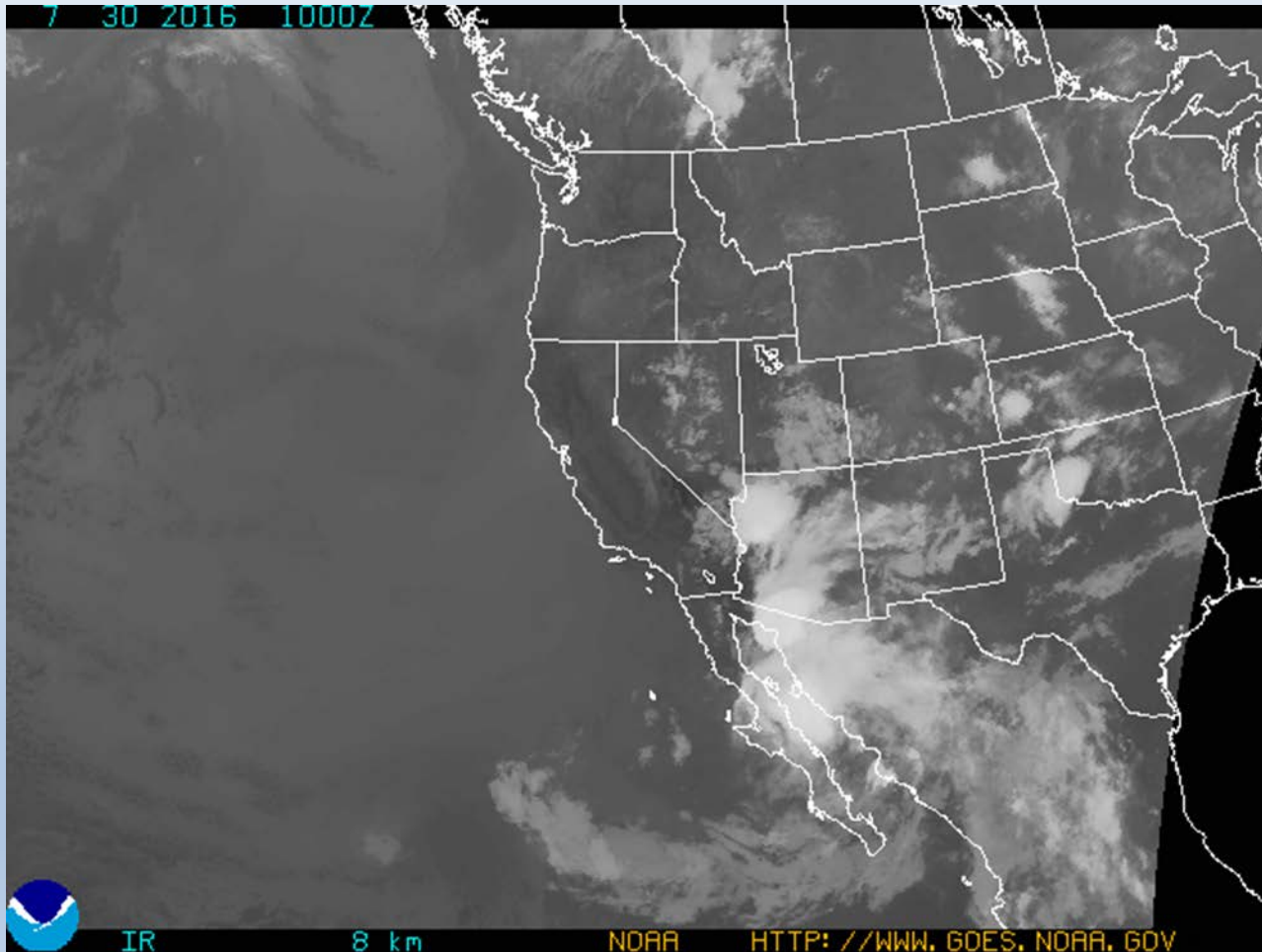
GOES-W IR, July 29, 2016, 2200 PST



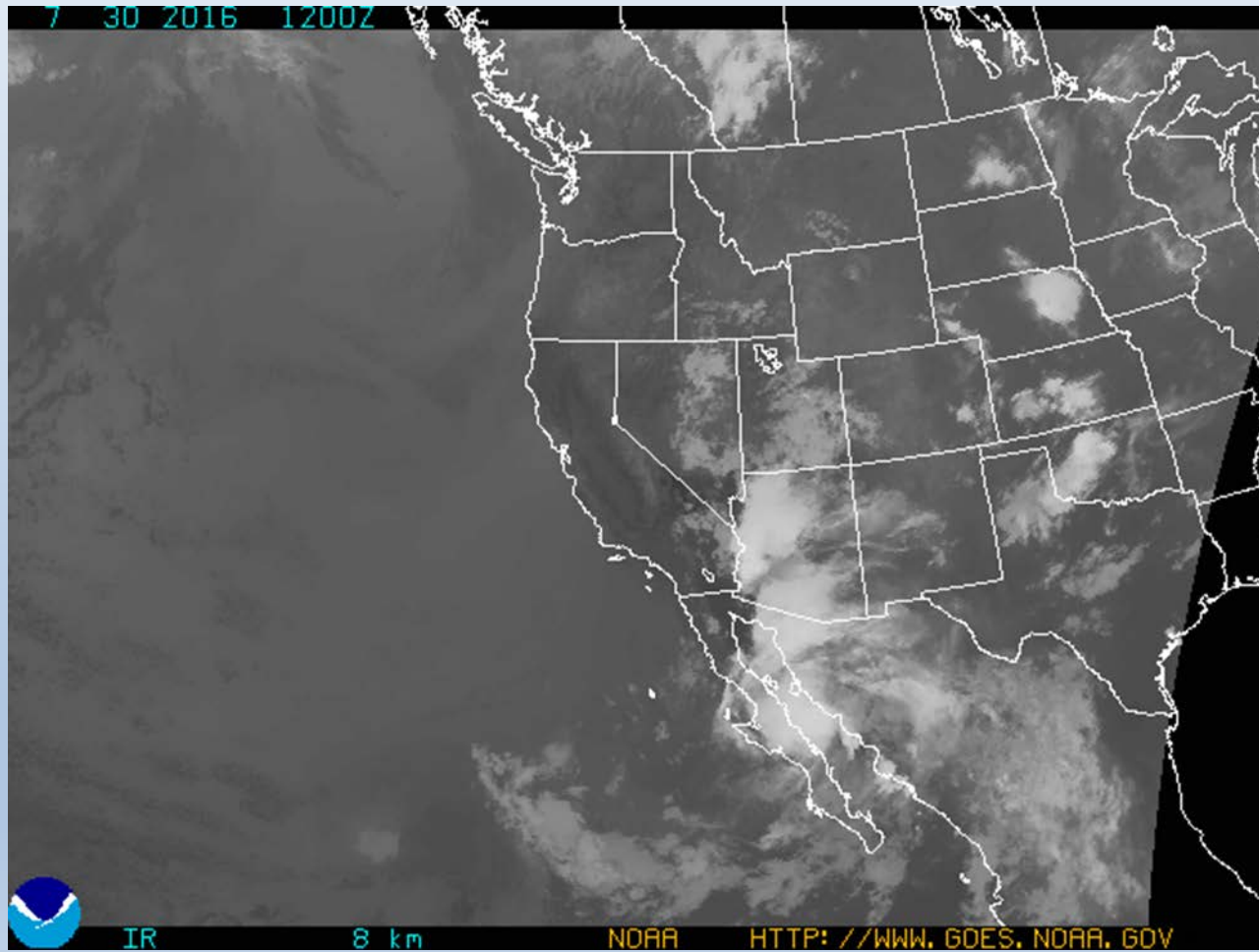
GOES-W IR, July 30, 2016, 0000 PST



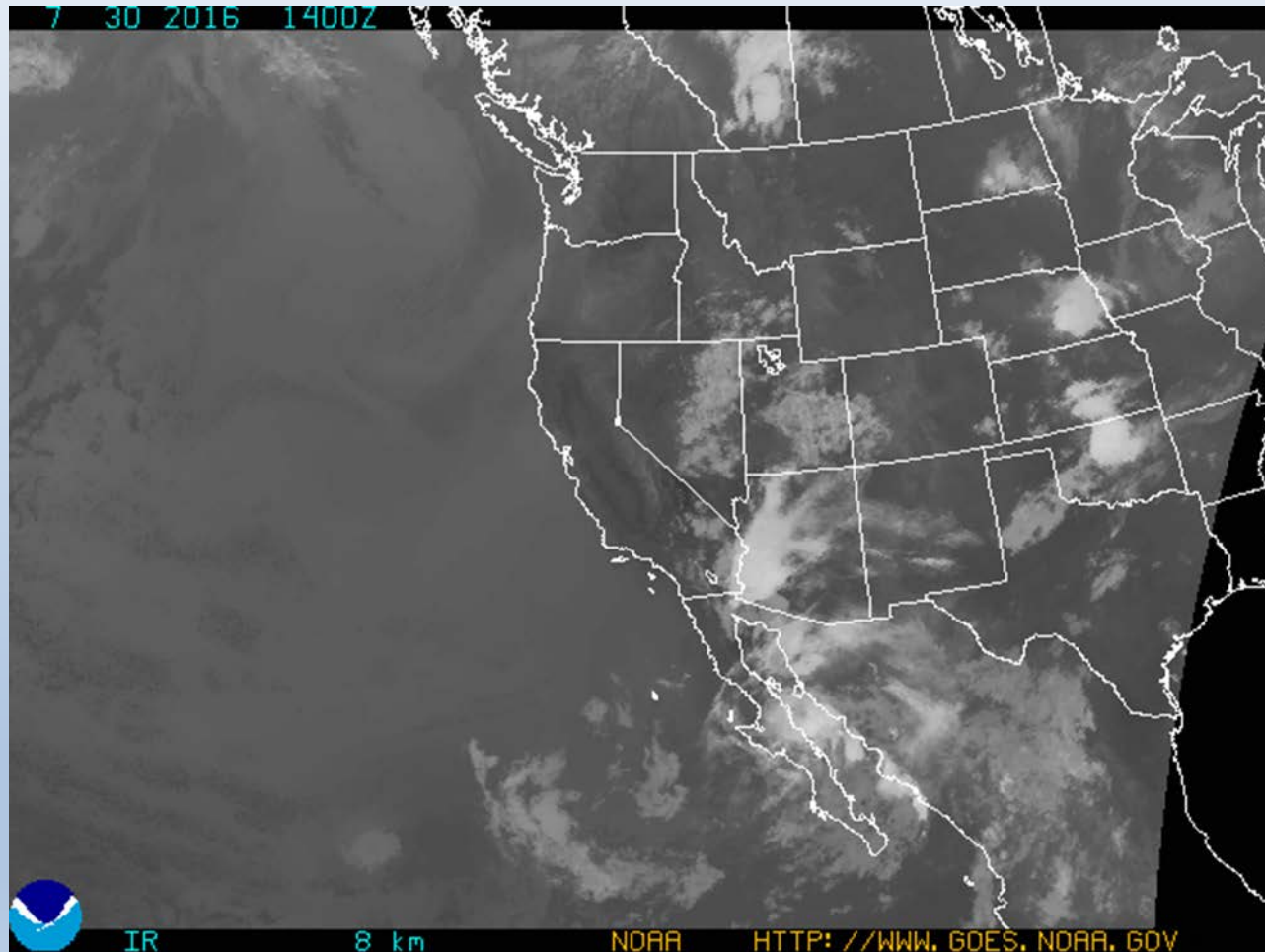
GOES-W IR, July 30, 2016, 0200 PST



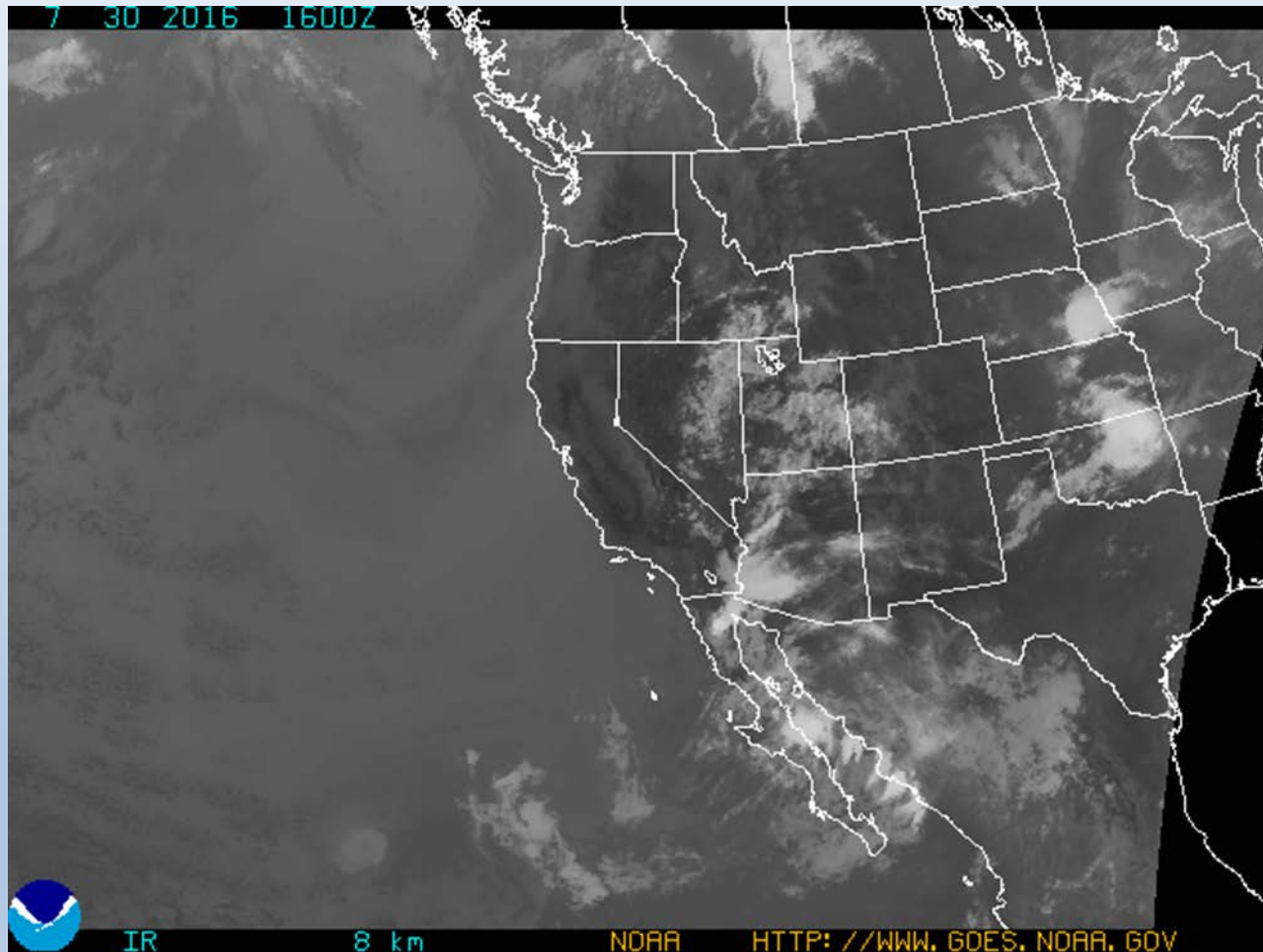
GOES-W IR, July 30, 2016, 0400 PST



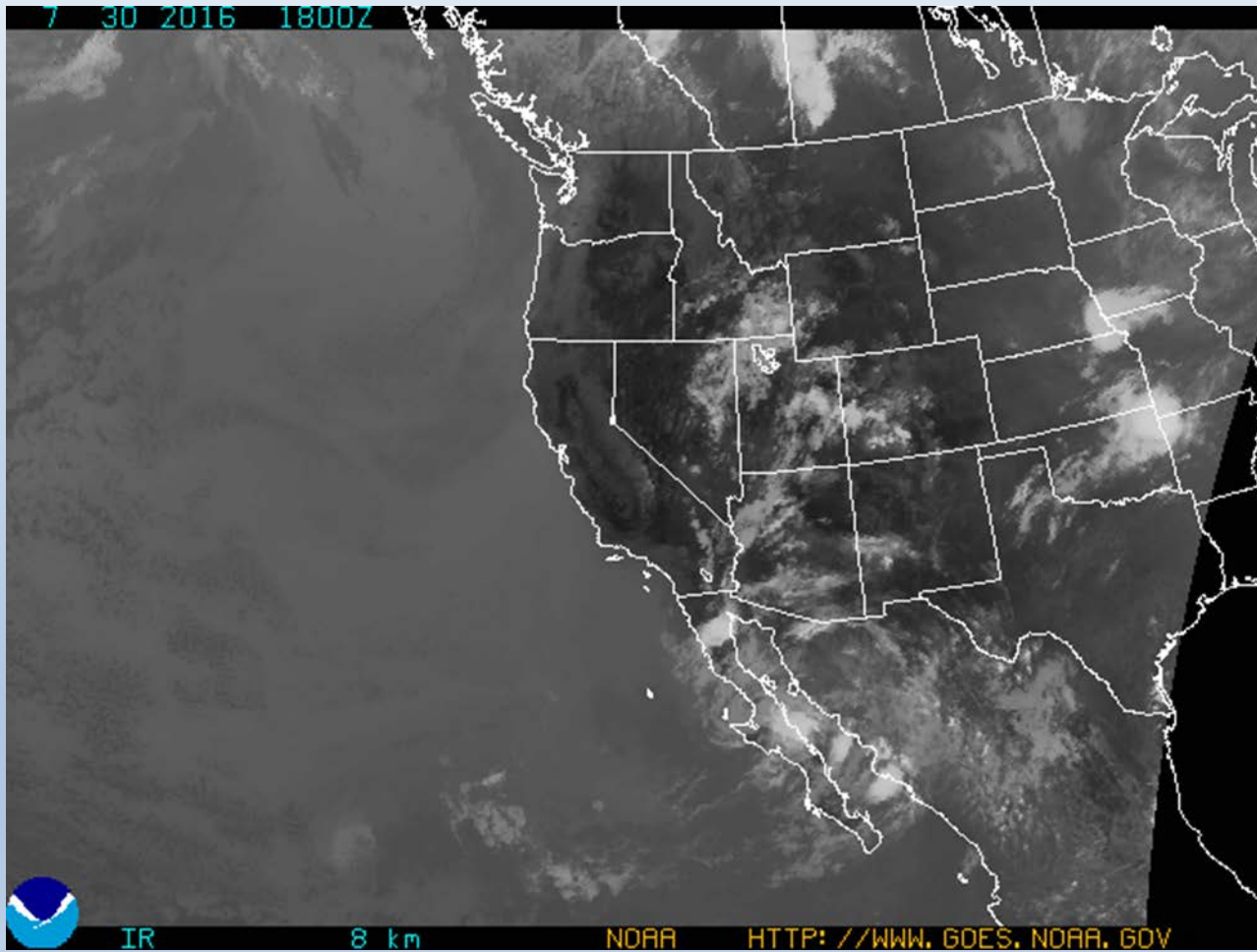
GOES-W IR, July 30, 2016, 0600 PST



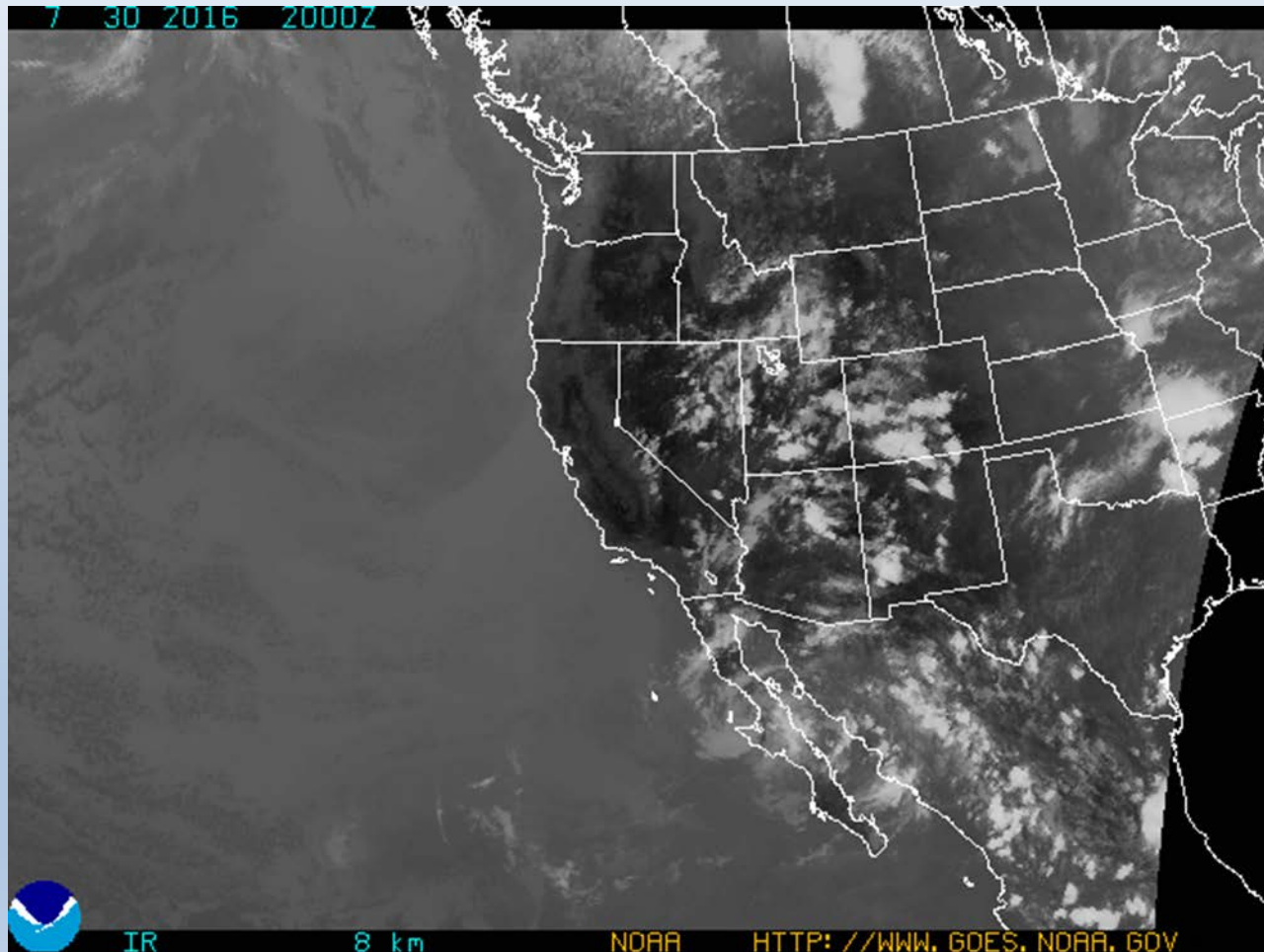
GOES-W IR, July 30, 2016, 0800 PST



GOES-W IR, July 30, 2016, 1000 PST



GOES-W IR, July 30, 2016, 1200 PST



VIIRS RGB and EDR AOT high quality

July 30, 2016

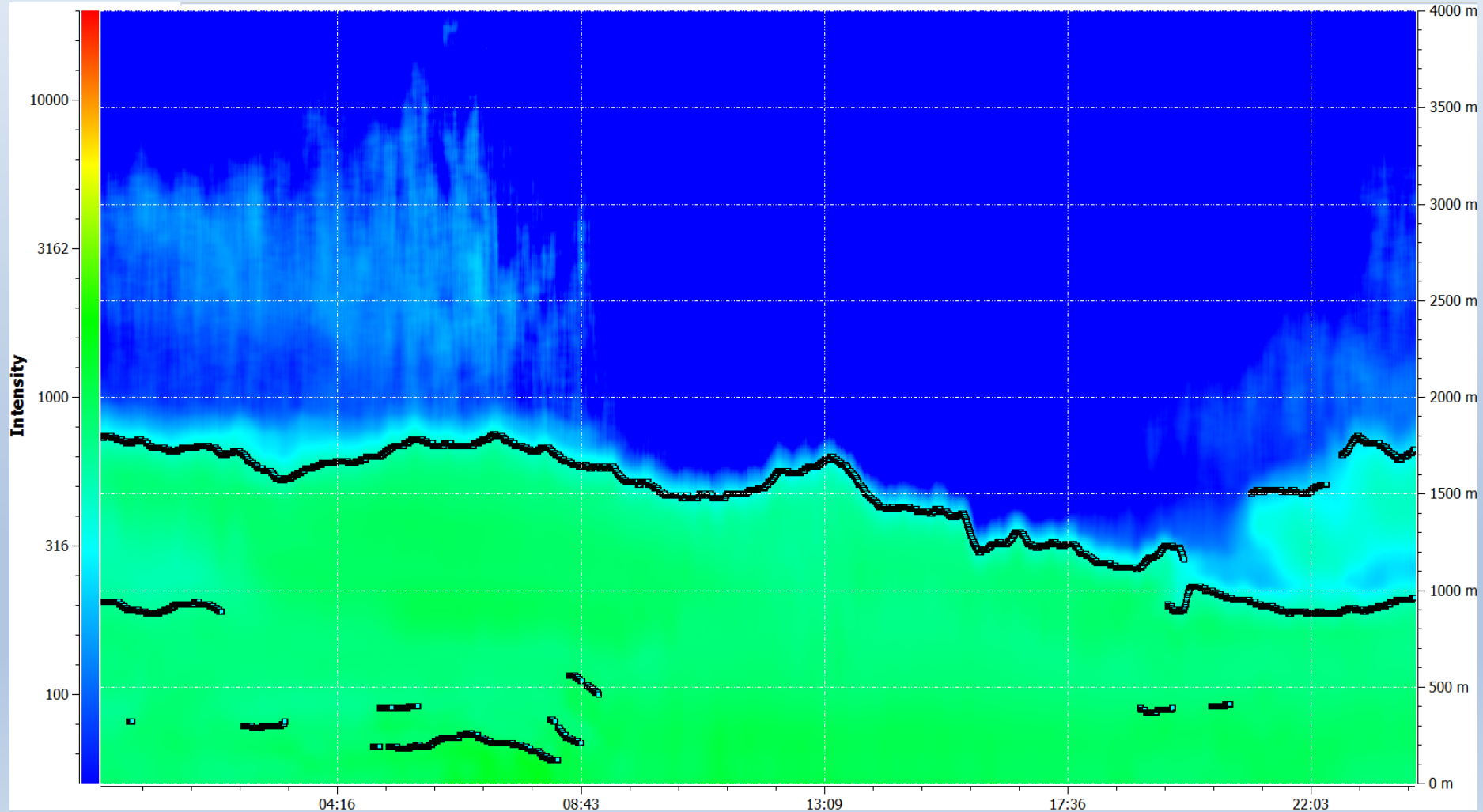
http://www.star.nesdis.noaa.gov/smcd/spb/aq/index.php?product_date=20160730&plot_type=VIIRS_google&product_id=4&zoom=6&lat0=34.907991783462684&lon0=-114.74957117810845&aotqual=0&aotopacity=100&fire=0&dust=0

eIDEA:

http://www.star.nesdis.noaa.gov/smcd/spb/aq/expr/expr2/index.php?plot_type=VIIRS_google&goto_date=20160730&plot_sel=6&zoom=6&lat0=30.000082876414957&lon0=-117.763916015625&smksel=1&smkopacity=100&fire=1&airnow=0&labels=1&county=0

Santa Clarita - Vaisala CL-51 Ceilometer

July 29, 2016 - Ozone Day



Santa Clarita - Vaisala CL-51 Ceilometer July 30, 2016 (PM10 Event)

