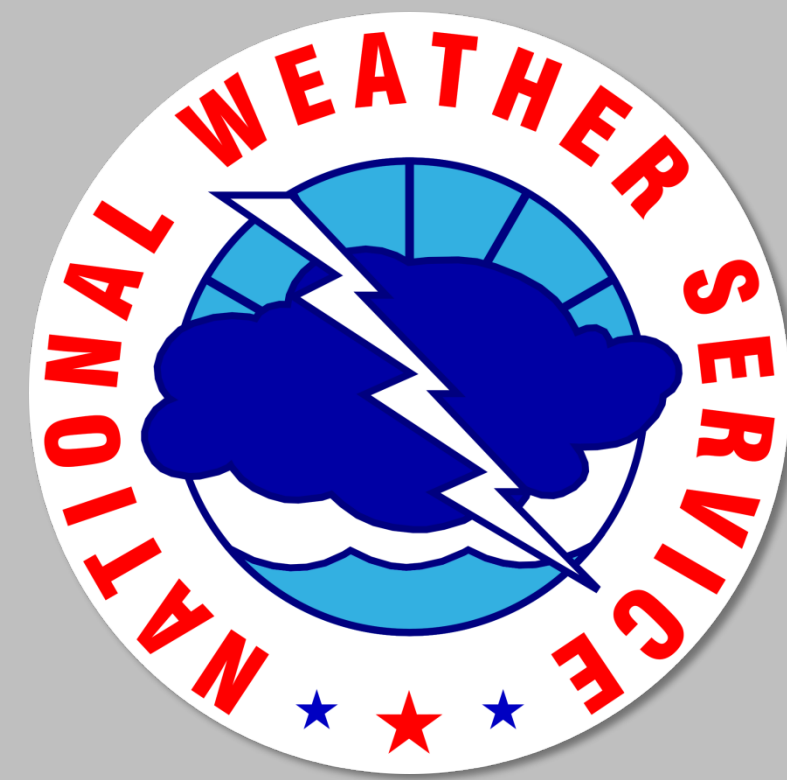# Utilization of GOES-16 Imagery in Forecast Operations in the Great Basin and Desert Southwest at the National Weather Service Forecast Office in Las Vegas, Nevada

Stan Czyzyk

The Great Basin and Desert Southwest presents many forecast challenges to the operational meteorologist. These challenges include radar coverage limitations, surface observation limitations, the predominance of pulse convection, as well as convectively and synoptically driven winds that provide significant operational impacts. The availability of satellite data from the recently launched GOES-16 satellite has provided imagery at increased horizontal and temporal resolution as well as the availability of new satellite channels and baseline products. This presentation will demonstrate how this new satellite data can be utilized in a variety of ways in the Great Basin and Desert Southwest.

Dust Storms and Initial GOES Imagery

GOES-16 data became available to the operational forecast In the National Weather Service in March, 2017 in a preliminary, non –operational manner. The value of the data very quickly became apparent to our operational staff almost immediately. One example of this is demonstrated in a large dust storm that occurred on March 30, 2017 as well as with additional events that were observed throughout the spring.

* Strong synoptic cold front was pushing north to south across southern Nevada and southeast California
* Initially, plumes of dust were being lifted off of many of the dry lake beds in the area and were quite evident in the 1-min Visible (Red) imagery
* By late afternoon, a solid wall of dust was forming over the Death Valley N.P.

Figure 2. Wind Erodibility Groups. Level 1, 2, 3 are indicated.

* Numerous plumes of dust across San Bernardino merged with the southward progressing wall of dust from Death Valley N.P. to produce the widespread dust storm as evident by the GOES-16 natural color satellite image (Figure 1).
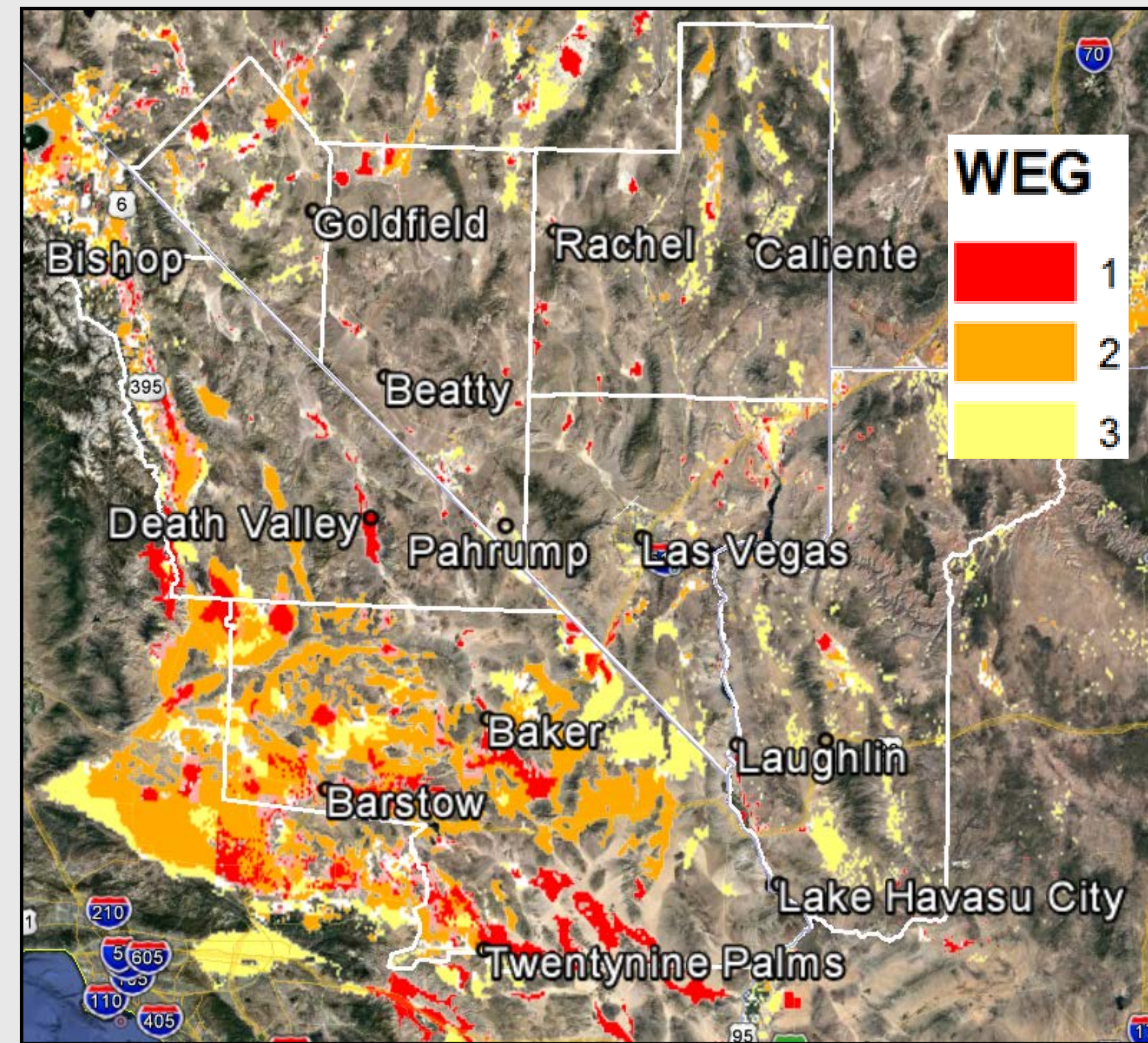
Wind Erodibility Groups (WEG)

* Developed by USDA/NRCS
* Groups soils that have similar properties affecting their resistance to blowing/lofting.
* 8 Wind Erodibility Group (WEG) Levels available
* WEG Level 1 indicates the most susceptible soils to blowing/lofting
* We utilize WEG 1, 2 and 3
* Overlay radar Z/R and model wind fields to anticipate the potential for blowing dust and the issuance of any WWAs or social media posts

Figure 2. Wind Erodibility Groups. Level 1, 2, 3 are indicated.

* Special thanks to Nathan Foster for implementing this at WFO Las Vegas
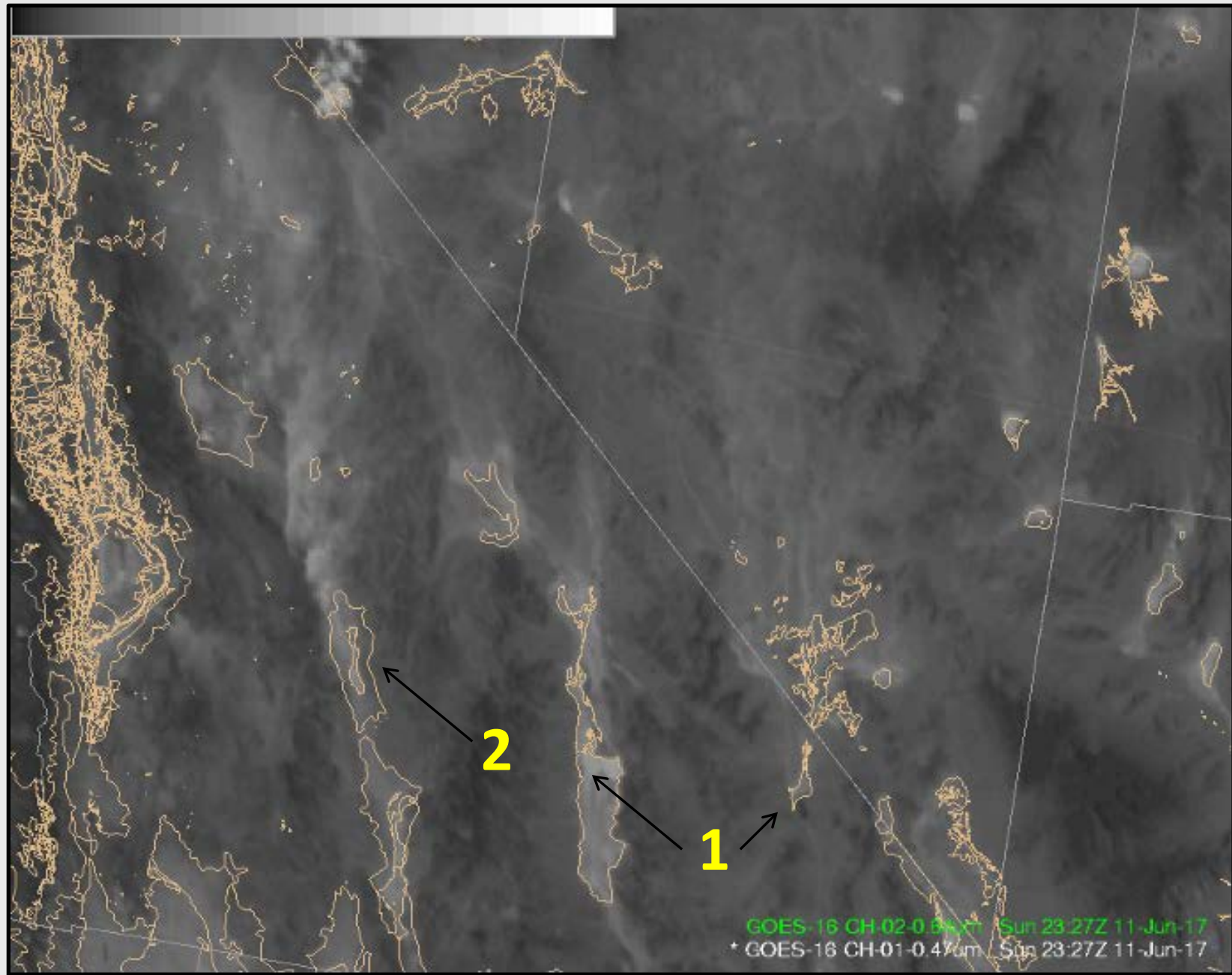
WEG Activation Events

Figure 3. GOES-16 Channel 2, Red -Visible Image with WEG Levels overlaid. Areas are predominantly WEG 1 and 2.
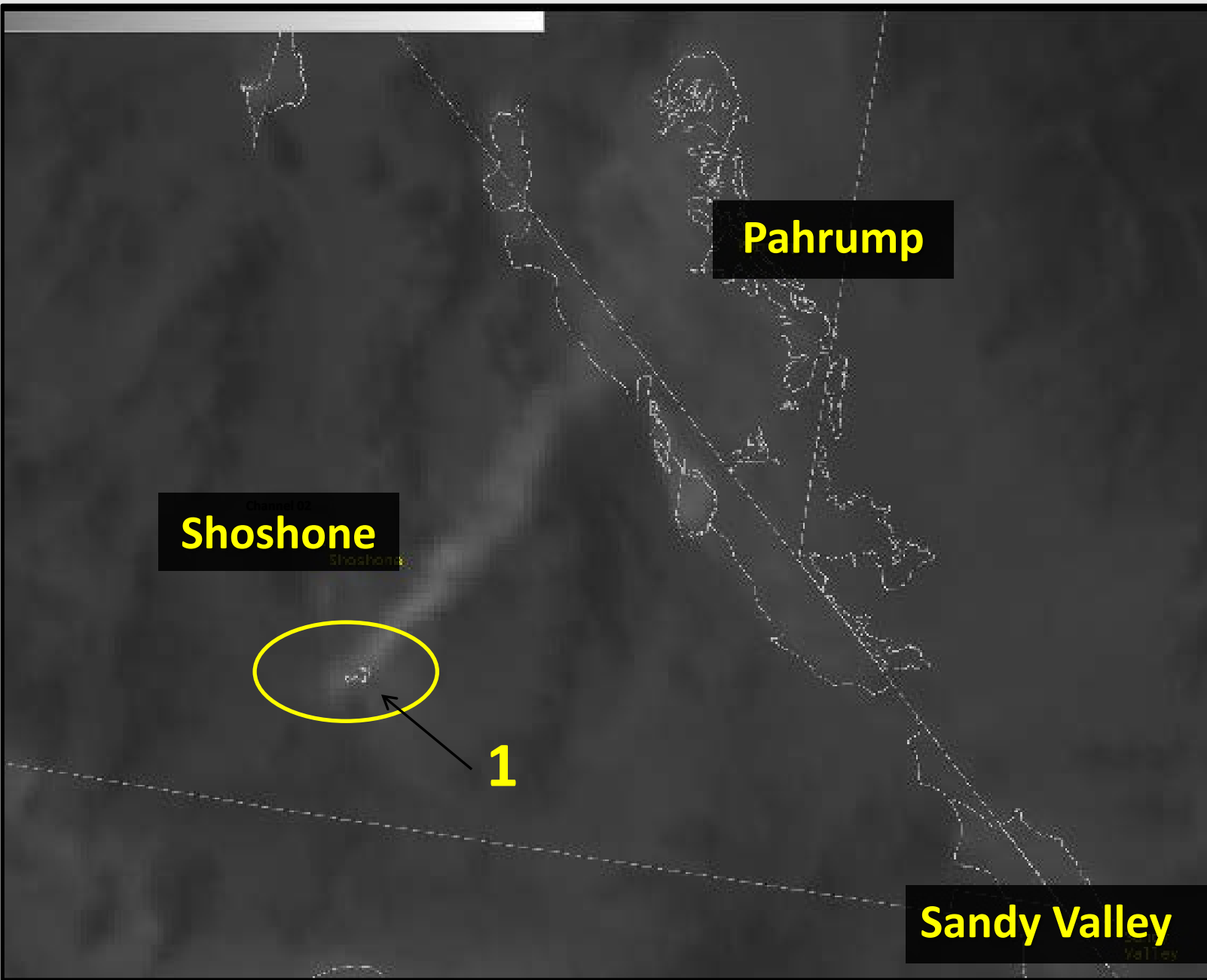
Figure 4. GOES-16 Channel 2, Red-Visible Image with WEG Levels overlaid. Highlighting area south of Shoshone, CA.

A wind event on June 11, 2017 produced widespread blowing dust across much of the southern Great Basin and Mojave Desert. Wind speeds of 25-35 mph with gusts to 40-50 mph were common with localized areas with gusts of 60-75 mph.

An extremely small area of WEG Level 1 produced a highly impactful plume of dust. Blowing dust and reduced visibility was noted along area roadways 30 miles to the northwest in Pahrump, NV.

The high-resolution GOES-16 data (both spatially and temporally) have provided better situational awareness and provided timely decision support services. GOES-16 had help increase out level of support to both the general public and to core partners.
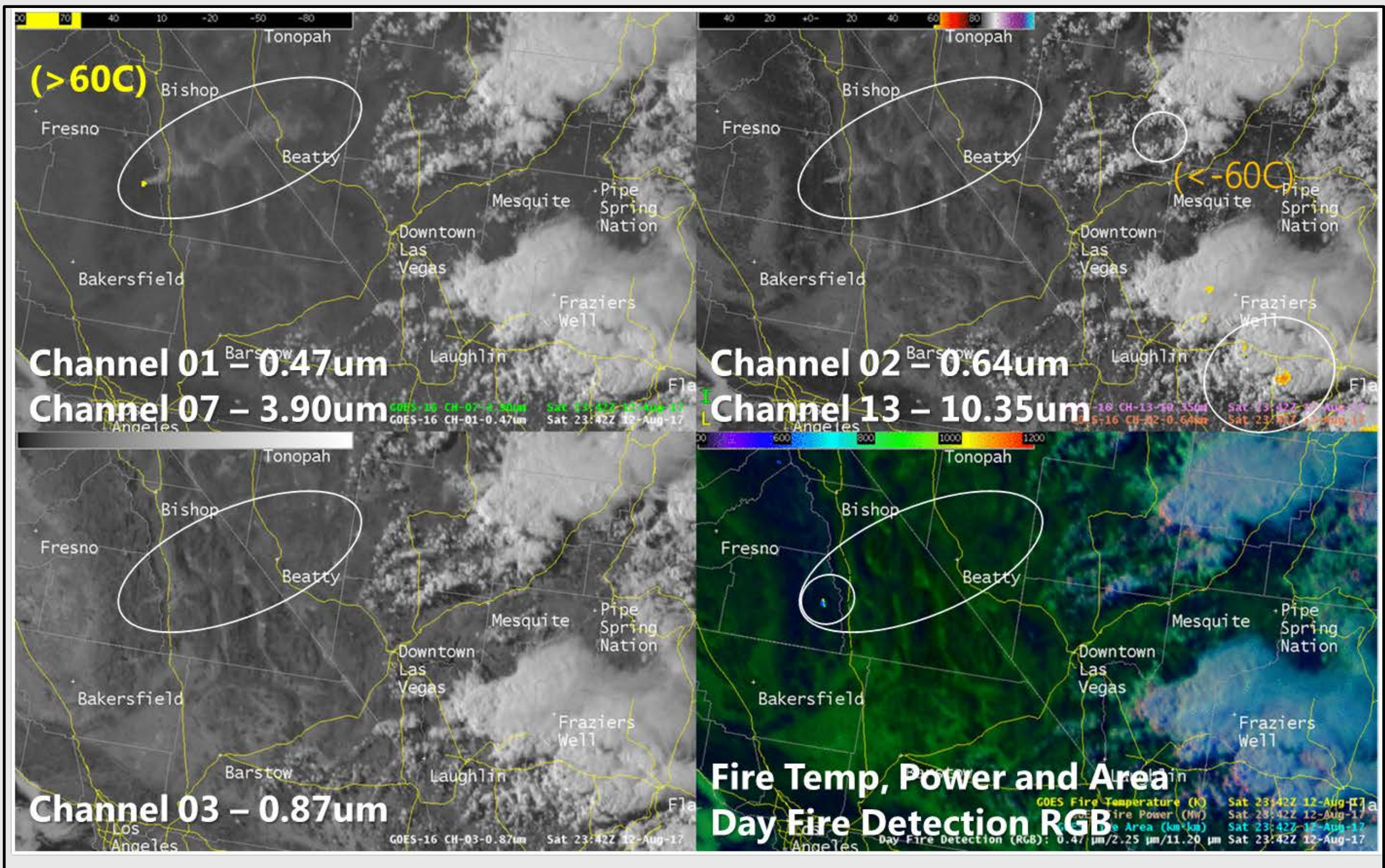
Fire Weather and Enhanced Convection

Figure 5. GOES-16 Channels used to depict fire weather and convective threats simultaneously .

Radar Coverage and Parallax

* Radar coverage is reduced in the Desert Southwest and especially in the Great Basin

* Many times satellite, surface observations and lightning data are the primary tools in warning decision making

* GOES-16 with improved spatial and temporal resolution has greatly aided the operational forecaster, particularly in data void areas

* 1-min Satellite data has improved situational awareness and increased lead time for a variety of decision support services.
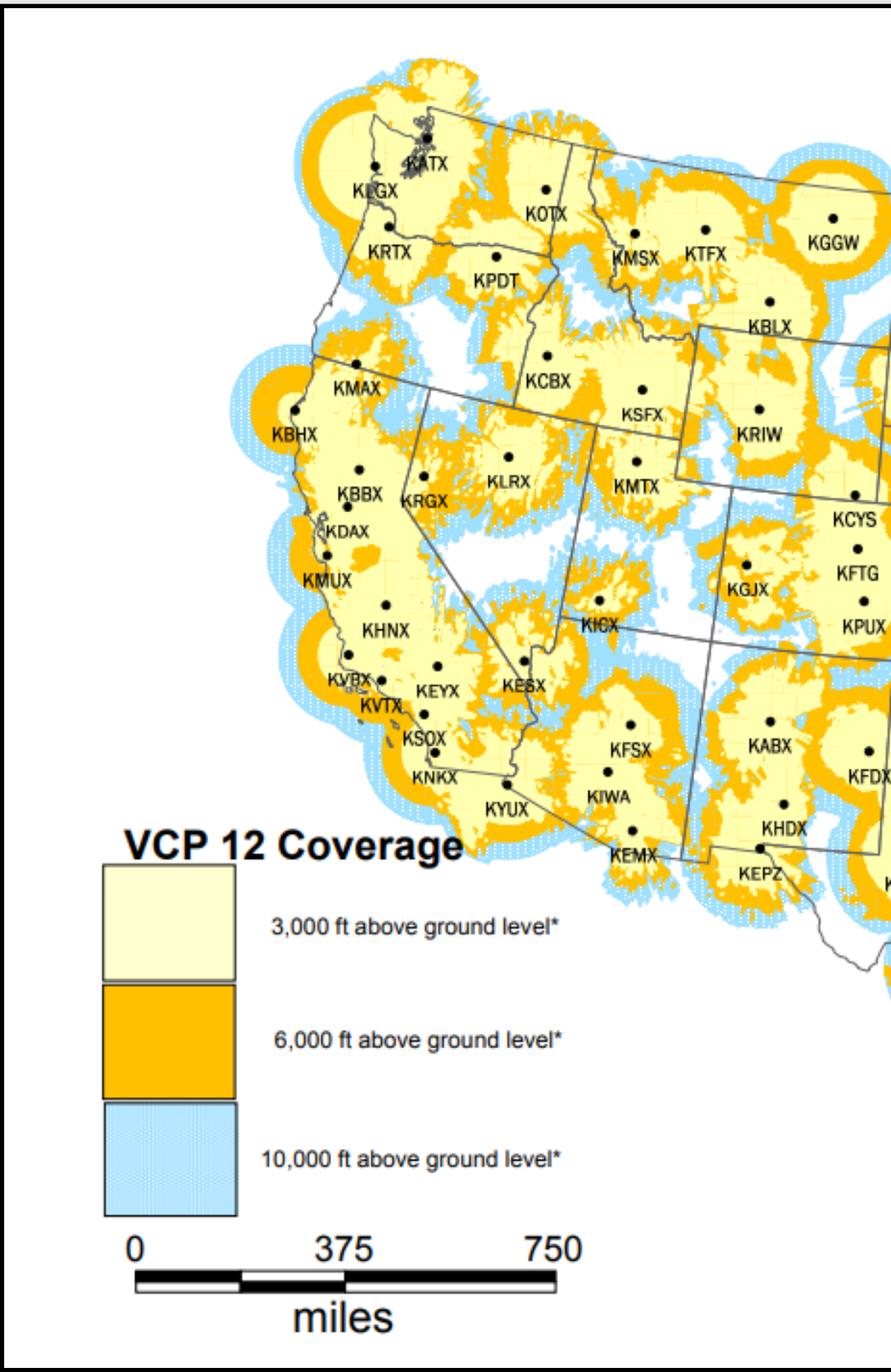
Figure 6. WSR-88D Radar Coverage

* In addition to areas with limited radar coverage, GOES-16 has provided dividends during brief radar outages.

* Noteworthy differences in storm position is evident when satellite IR temperatures are compared to lightning data (parallax)
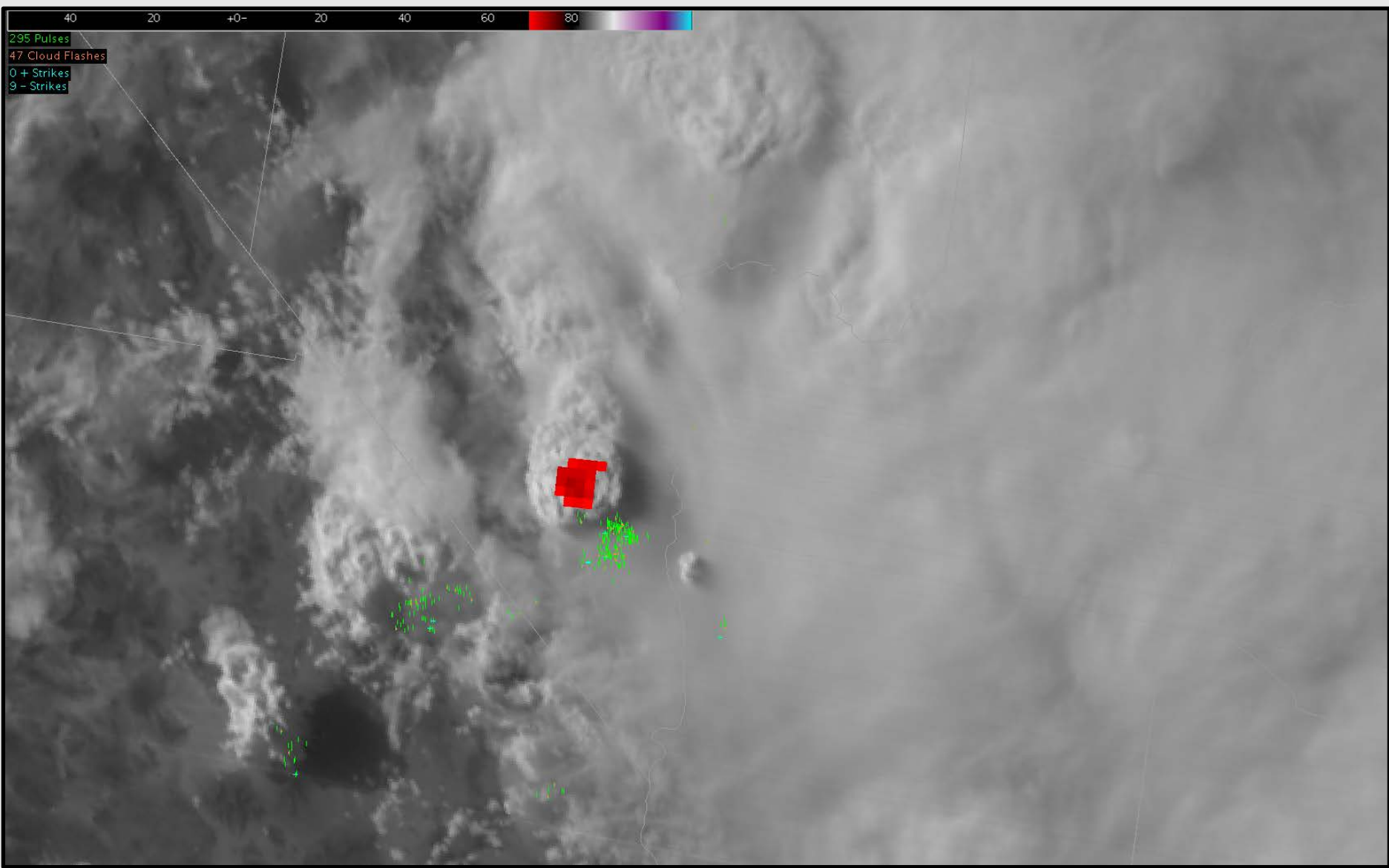
Figure 7. GOES-16 Channel 2, Red-Visible Image with IR temps < -70C and ETLN lightning data. Notice satellite parallax by lightning offset.
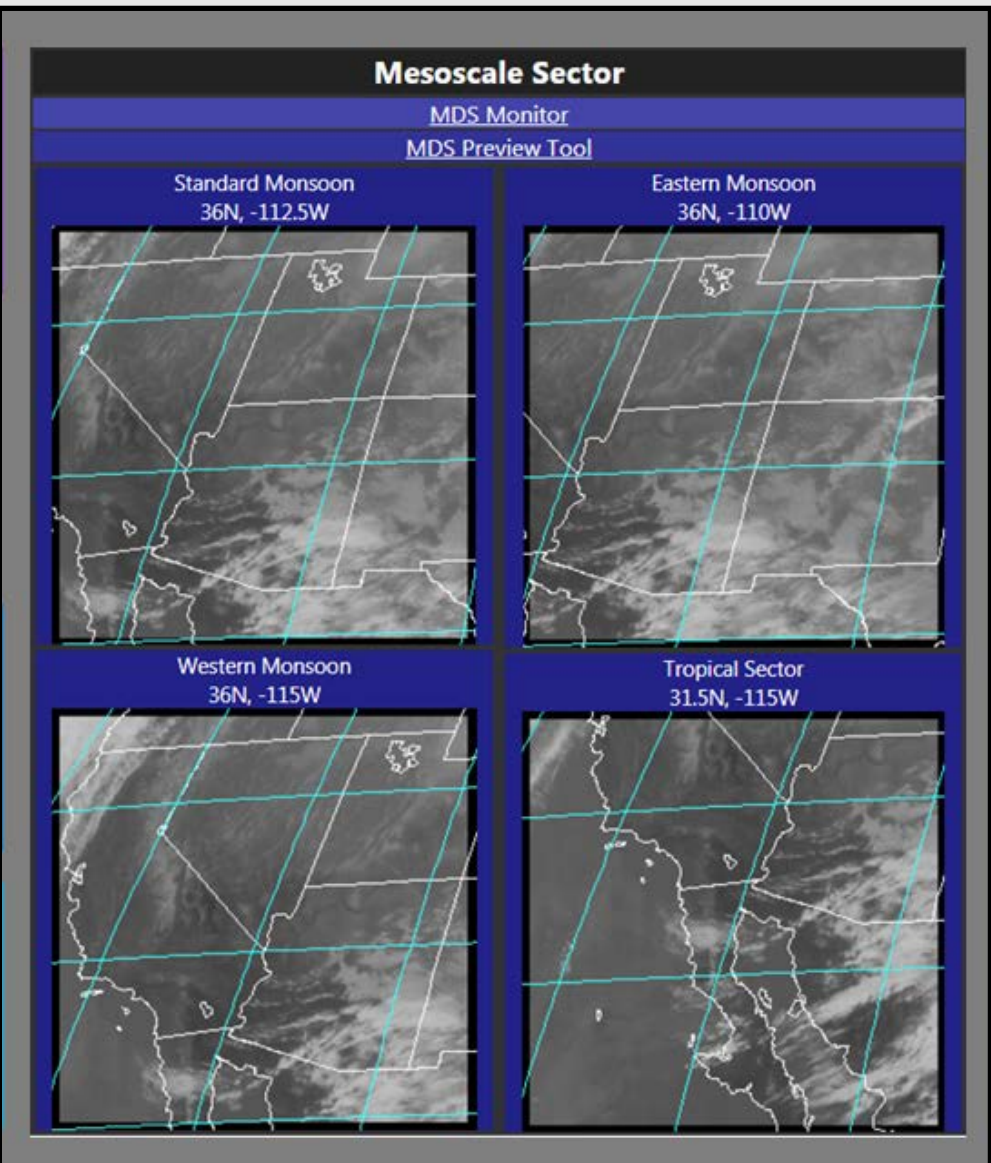
* WFO Las Vegas utilizes a locally developed tool for MDS selection which improves situational awareness, makes simplifies the request process and improves collaborative efforts with neighboring offices.

* Special Thanks to Reid Wolcott for the MDS tool development

Figure 8. MDS Request Tool

Contact Information and Satellite Loops

Stan Czyzyk, SOO, NWS Las Vegas
Stanley.Czyzyk@noaa.gov