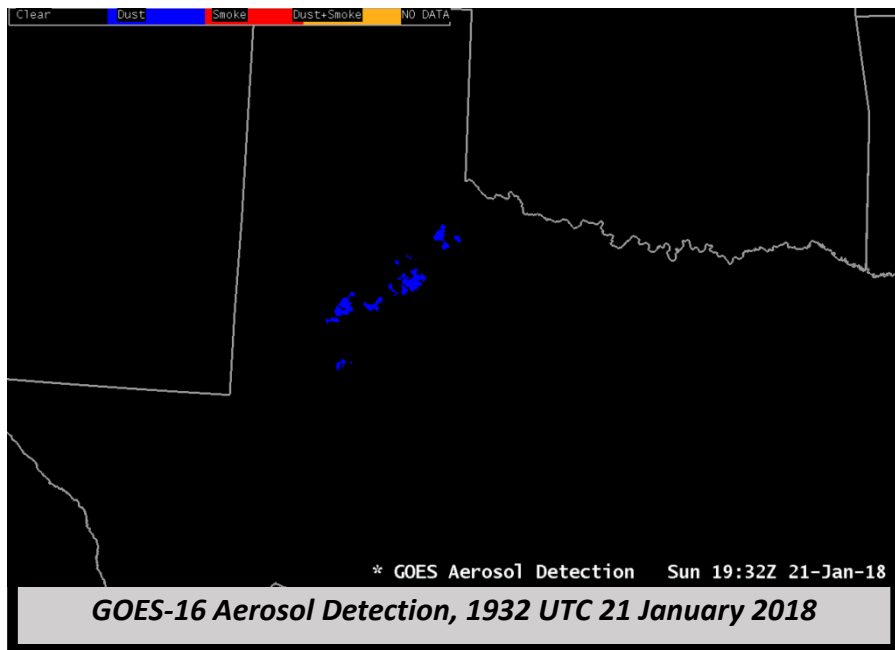# Aerosol Detection

# Quick Guide

## Why is Aerosol Detection Important?

Aerosols released into the atmosphere from anthropogenic activity (cars, industry) and natural events (fires, dust storms) affect human health, reduce visibility, and alter Earth's radiation budget. This qualitative Aerosol Detection Product notes the presence of dust and smoke in the atmosphere. Aerosol Optical Depth (AOD) is a quantitative estimate of the amount of aerosol present obtained using a different algorithm. This product is can help field forecasters and IMETs who provide warnings and watches for dust and smoke.



Clear  Dust  Smoke  Dust+Smoke  NO DATA

* GOES Aerosol Detection    Sun 19:32Z 21-Jan-18

**GOES-16 Aerosol Detection, 1932 UTC 21 January 2018**

## Aerosol Detection Specifications

| Domain | Temporal Refresh | Product Accuracy | Resolution |
|---|---|---|---|
| **Full Disk** | 15 minutes | Dust: 80%  Smoke: 80% Land/70% Ocean | **2 km** |
| **CONUS** | 15 minutes | | |
| **Mesoscale** | 5 minutes | | |

## Impact on Operations

**Primary Application:** Aerosol Detection identifies the type of aerosol in the atmosphere. The product is useful to identify obstructions to visibility and for forecasts of air quality. It helps with operational air quality forecasting and monitoring.

**Application:** Compare this product to channel differences and other products. The Dust RGB, for example, and/or the Split Window Difference (10.3 µm – 12.3 µm) both highlight Dust in the atmosphere day and night. The Cloud Phase Difference (8.5 µm – 11.2 µm) does as well. Fire Detection Products can highlight sources of smoke. Compare Aerosol Detection to Aerosol Optical Depth (AOD) to determine the amount of aerosol present. AOD values > 0.5 constitute high aerosol loading.

## Limitations

**Daytime only application:** The GOES-16 Aerosol Detection algorithm uses reflectance channels and is therefore a daytime only product.

DAY ONLY

**Limitation:** Informative flags that could inform you why detection does/does not occur (snow/ice, cloud, etc.) are not included in the AWIPS display.

**Limitation:** Aerosols are detected only in cloud-free regions. Use caution if the satellite zenith angle > 60º.

**Limitation:** Detection over land and over water can differ, especially for smoke plumes.

Contributor: Scott Lindstrom    UW CIMSS

## Image Interpretation

Dusty pixels are identified as Blue

Smoke Pixels would be shown in Red; Pixels identified as Smoke and Dust would be orange. Daytime only.

Cloud Phase Brightness Temperature Difference (BTD) (below) and Moisture BTD (bottom) and Dust RGB (bottom right) also show a strong dust signal (circled). These infrared products work day and night.



Clear | Dust | Smoke | Dust+Smoke | NO DATA

* GOES Aerosol Detection     Sun 19:32Z 21-Jan-18
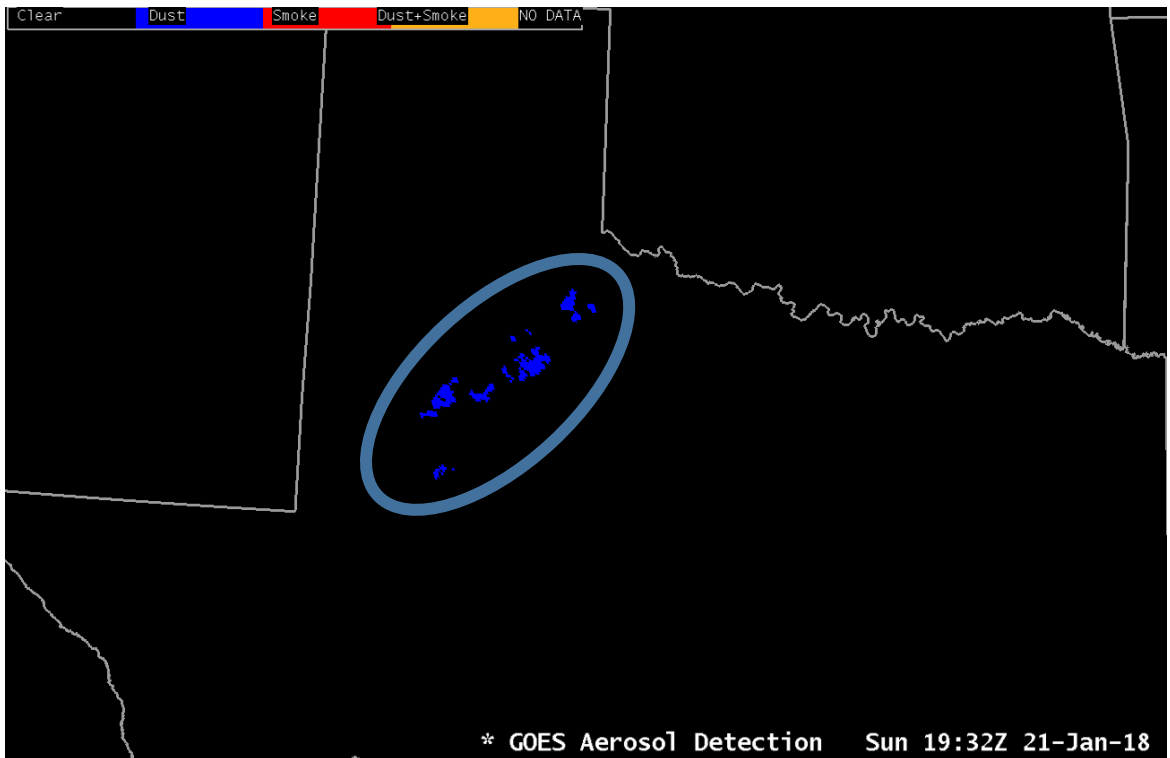
GOES-16 Aerosol Detection over West Texas during a Dust Storm, 1932 UTC on 21 January 2018
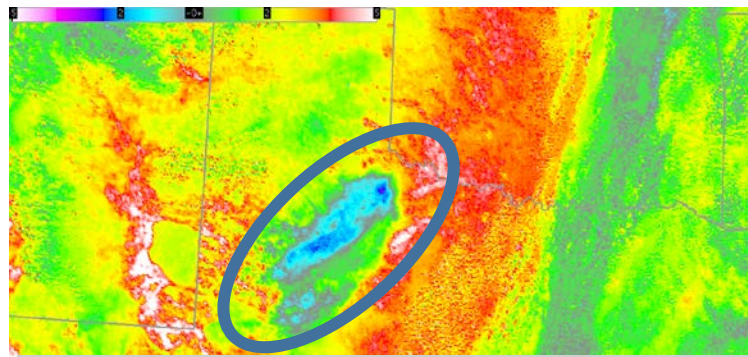


8.5 μm – 11.2 μm Brightness Temperature Difference



Dust RGB
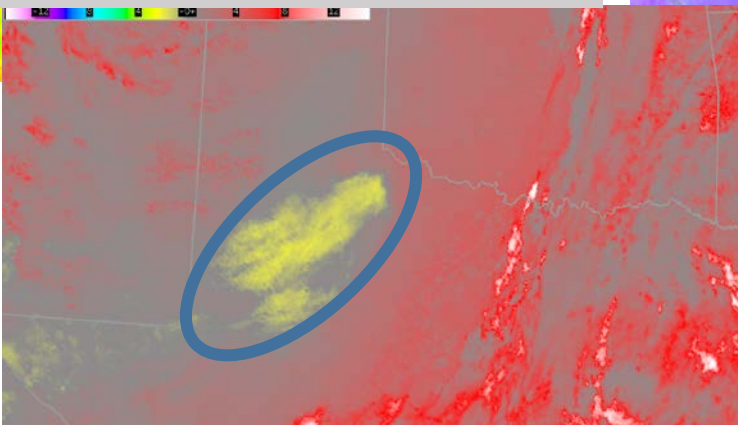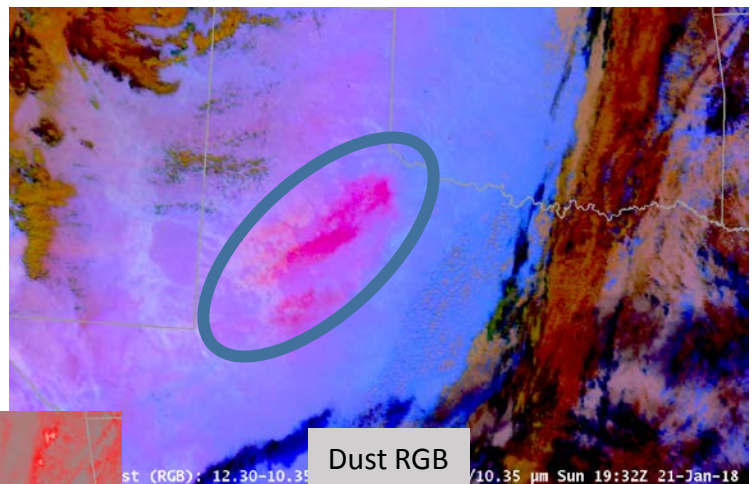


10.3 μm – 12.3 μm Brightness Temperature Difference

## Resources

**GOES-R.gov**
Aerosol ATBD

**Hyperlinks do not work in AWIPS but they do work in VLab**