



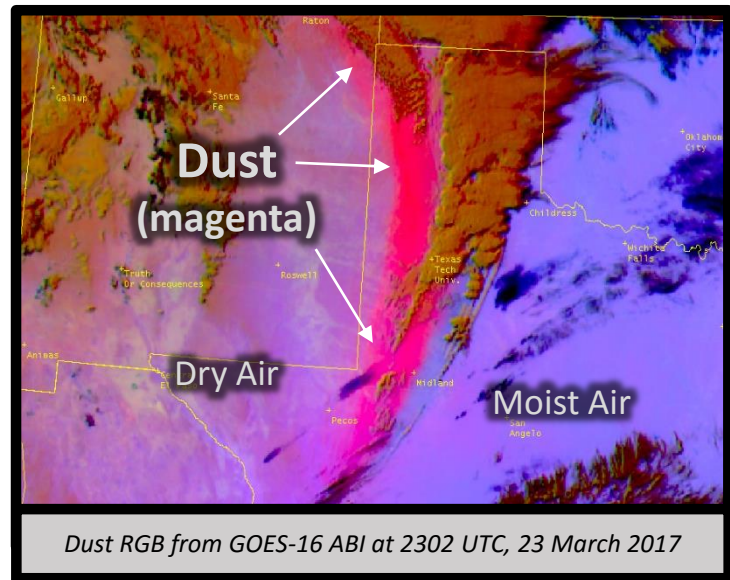
Dust RGB

Quick Guide



Why is the Dust RGB Imagery Important?

Dust can be hard to see in VIS and IR imagery because it is optically thin, or because it appears similar to other cloud types such as cirrus. The RGB product is able to contrast airborne dust from clouds using band differencing and the IR thermal channel. The IR band differencing allows dust storms to be observed during both daytime and at night. Dust appears pink/magenta during the day and can vary in color at night depending on height. Dust is also distinguishable in the RGB from land surfaces like deserts as well as oceans, given sufficient thickness/density. For cloudy regions this RGB also allows users to infer relative height of the observed cloud top surfaces as well as cloud phase and thicknesses.



Dust RGB Recipe

Color	Band / Band Diff. (µm)	Min – Max Gamma	Physically Relates to...	Small contribution to pixel indicates...	Large Contribution to pixel indicates...
Red	12.3-10.3	-6.7 to 2.6 C 1	Optical depth / cloud thickness	Thin clouds	Thick clouds or dust
Green	11.2-8.4	-0.5 to 20.0 C 2.5	Particle phase	Ice and particles of uniform shape (dust)	Water particles or thin cirrus over deserts
Blue	10.3	-11.95 to 15.55 C 1	Surface temperature	Cold surface	Warm surface

Impact on Operations

Primary Application

Identifying dust: Dust plumes are easily distinguished from surrounding clouds, both day and night.



Height of dust (night only): At night, the resulting dust color changes with height. Low-level dust plumes have a purple/plum color and changes to pink/magenta with height.

Secondary Applications: Cloud height/type analysis, inferring air mass/moisture boundaries (low vs high humidity), volcanic ash (orange/peach)

Limitations

High clouds obscure dust:

High cloud cover can obscure dust plumes beneath them and make spatial analysis of the dust more difficult.



Dust thickness typically unknown:

Magenta/pink variations in daytime are not indicators of thickness, but rather density. However, very thick dust plumes are purple in both day and night scenes.

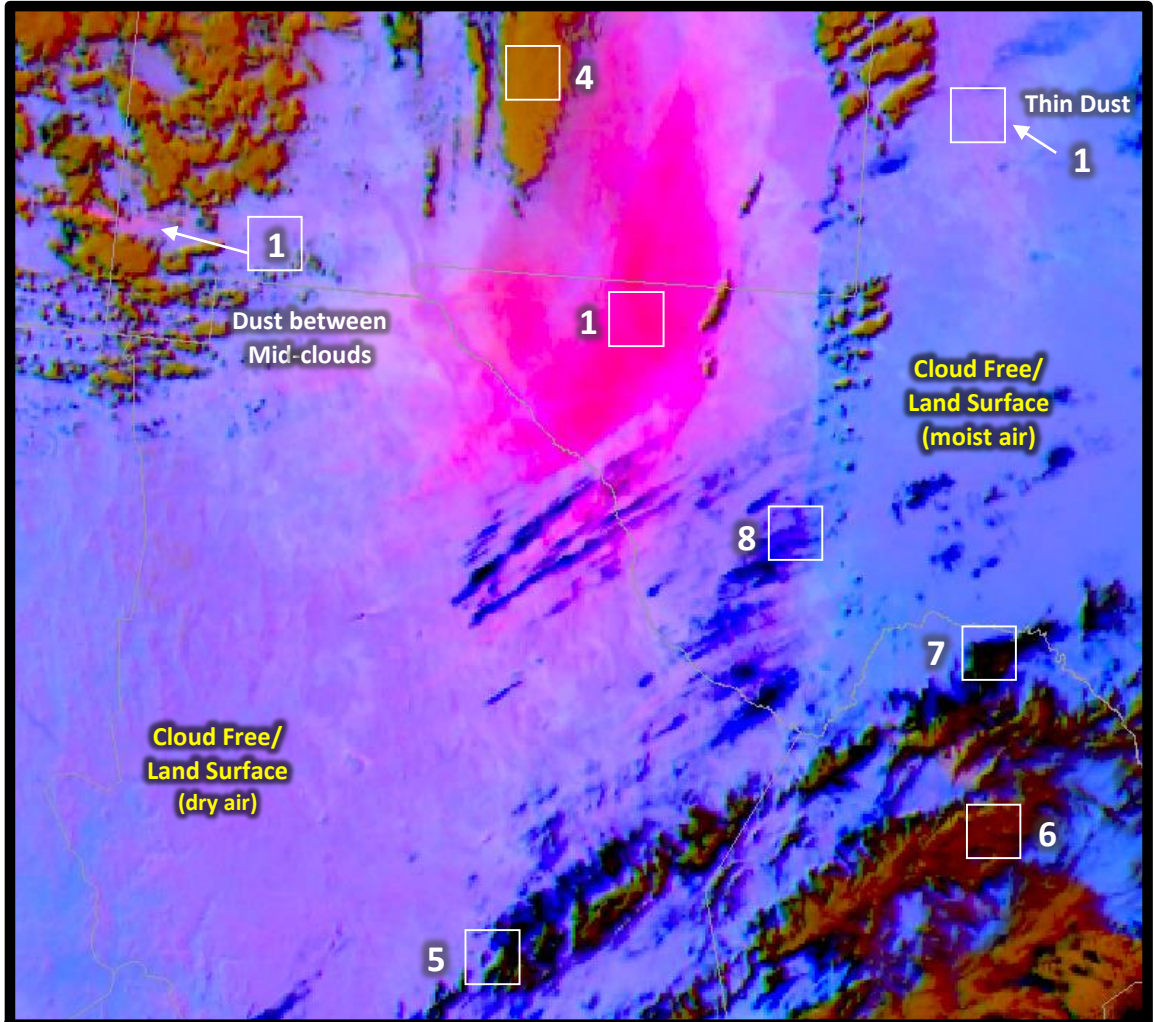
Low clouds look like dust over oceans: Marine stratus over the ocean in the tropics appear light purple and can look similar in color to dust, particularly at night.

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RGB Interpretation

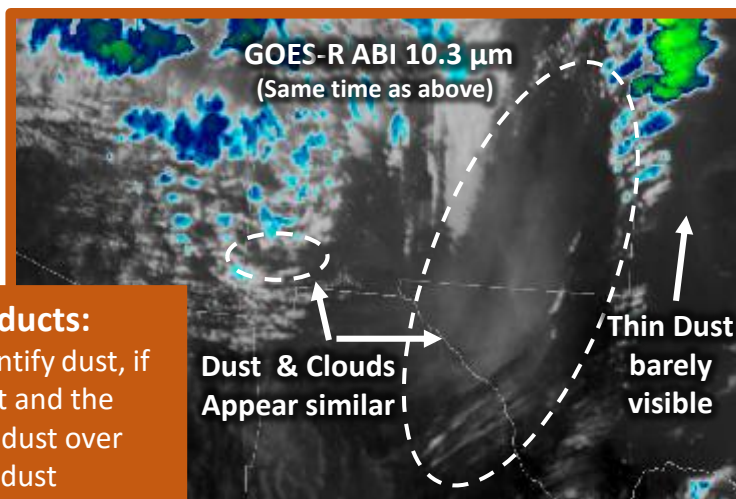
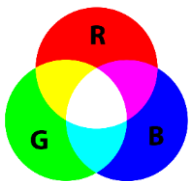
- 1** Dust plume (day)
(bright magenta, pink)
Note: Dust at night becomes purple shades below 3 km
- 2** Low, water cloud
(light purple, not shown)
- 3** Desert surface (day)
(light blue, not shown)
- 4** Mid, thick clouds
(tan shades)
- 5** Mid, thin cloud
(green)
- 6** Cold, thick clouds
(red)
- 7** High, thin ice clouds
(black)
- 8** Very thin cloud
(Over warm surface) (blue)



Dust RGB from GOES-16 ABI at 2247 UTC, 23 March 2017, centered in extreme west Texas

Note: colors may vary diurnally, seasonally, and latitudinally

RGB Color Guide



Comparison to other products:

IR imagery can be used to identify dust, if the contrast between the dust and the background is bright enough (dust over the hot desert). Detection of dust becomes more difficult in single-channel IR imagery at night or over oceans.

Resources

UCAR/COMET
[Multispectral Satellite Applications: RGB Products Explained.](#)

NASA/SPoRT
[Dust RGB micro-lesson:](#)

EUMETrain
[RGB Interpretation Guide](#)

Hyperlinks not available when viewing material in AIR Tool