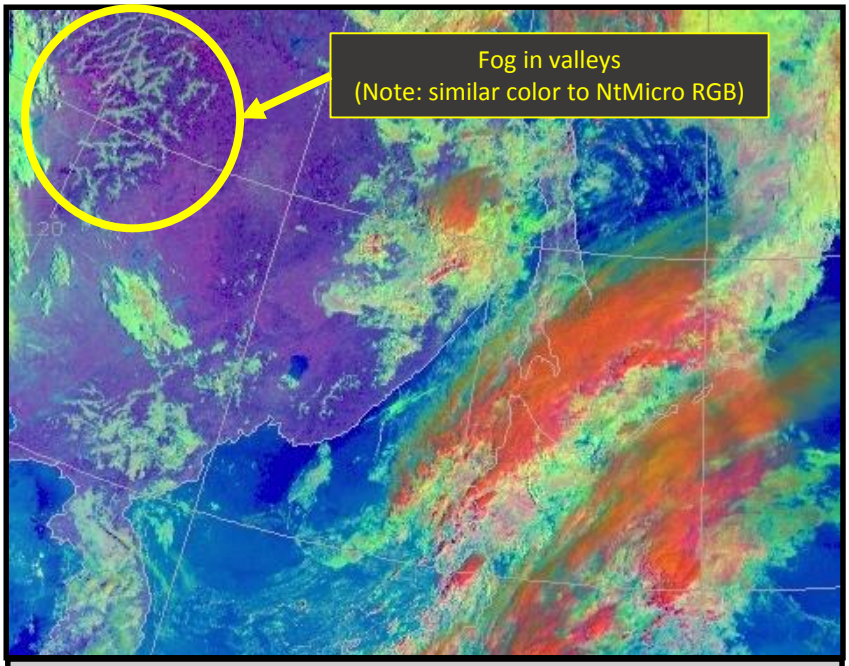
Daytime Microphysics RGB

Quick Guide

Why is the DtMicro RGB imagery Important?

The Daytime Microphysics (DtMicro) RGB combines information about the cloud brightness, cloud particle phase and size, and cloud top temperature in order to analyze convective clouds as well as other cloud and surface features. The cloud particle phase and size can be qualitatively determined to estimate if strong updrafts are associated with the convection or if warm rain processes are active. Other benefits are the identification of cloud types, including fog and low stratus as well as fires, snow, and contrails.



DtMicro RGB from Himawari-8 AHI at 0400 UTC 9 Sept 2015

DtMicro RGB Recipe

Color	Band / Band Diff. (µm)	Physically Relates to…	Small contribution to pixel indicates…	Large Contribution to pixel indicates…
Red	0.8	Visible brightness of cloud as proxy to thickness	Thin cloud or non-reflective surface	Thick cloud (water and/or ice) or reflective surface
Green	3.9 (reflectance only)	Phase and particle size of cloud tops	Large particles in the cloud tops, or on ground	Small water or ice particles in the cloud tops
Blue	10.4	Temperature of the surface being observed	Very cold clouds or surface	Very warm clouds or surface

Impact on Operations

Primary Application:

Convection: Orange clouds indicate strong convection. The convective, thick clouds are visibly bright (large red) and the smaller particles at the cloud top are more reflective (medium green) while being very cold (small blue). Moderate to weak convection is dark orange to red (larger particles).

Low Cloud and Fog: Allows the separation of cloud features including low clouds and fog (aviation).

Low-Level Precip: Aside from deep convection, low level warm and cold precip. clouds are identified.

Land Features: snow/ice on the ground (bright magenta, fire hot spots (bright aqua)

Limitations

Daytime application: The shortwave IR band uses only the reflectance portion and not the radiance. And, the visible channel is only available during the day.

Large number of colors: A scene with many cloud types and surface variations will have a large number of colors, creating a complicated scene.

Sun Glint / Angle: Some cloud/land features will change color depending on how the solar reflectance is oriented compared to the satellite view

Varying Seasons / Latitude: Like single-channels, the reflectance/temperature will change with latitude/season, and hence influence the color.

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RGB Interpretation

1 — Thick, small ice, high cloud
Cb, strong convection, likely precip
(orange) [1,3,4,5,6]

2 — Thick, large ice, high cloud
Cb, weak convection, likely precip
(dark orange, red) [1,2,3]

3 — Thin, small ice, high cloud
Cirrus *(green to dark green)* [1,2,3,4]

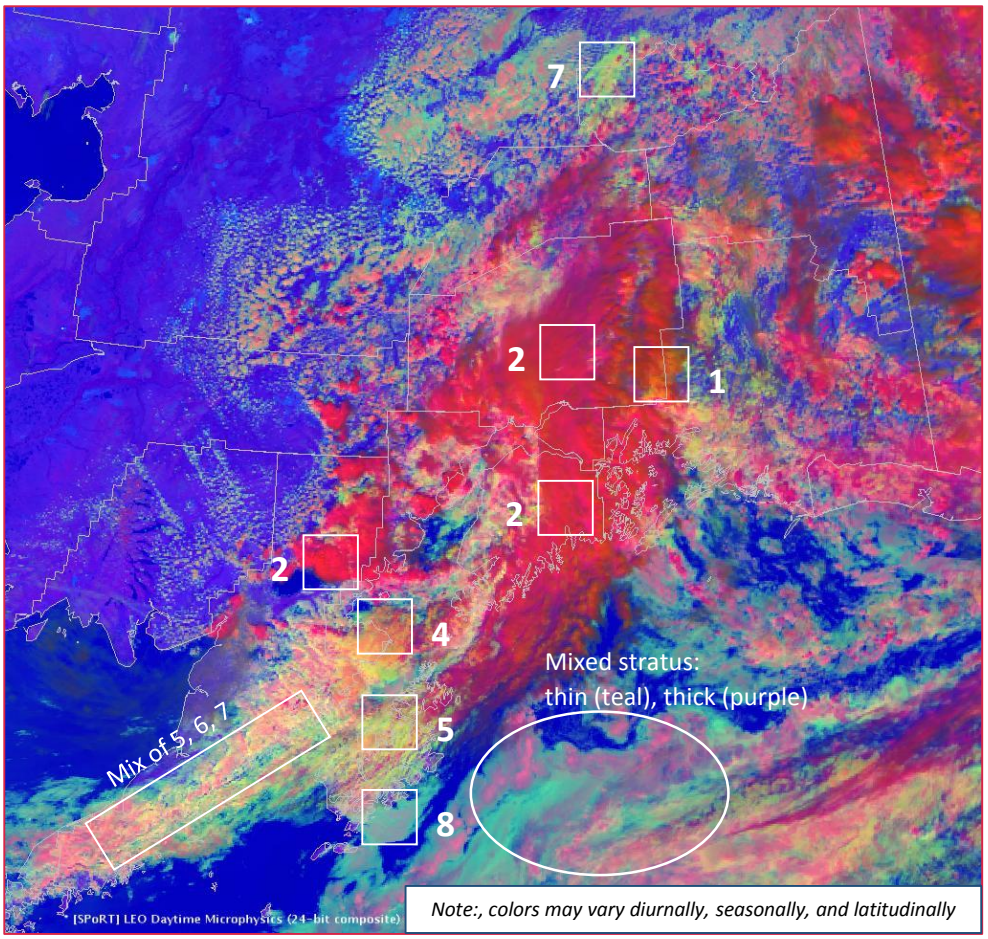
4 — Thick, large drops, mid cloud
Supercooled water cloud *(tan to light orange)* [4]

5 — Thick, small drops, mid cloud
Supercooled water cloud
(yellow to yellowish-green) [1,2,3,4,5,6]

6 — Thick, large drops, low cloud
Precipitating (warm rain process)
(violet to dark magenta as particle size increases) [1,2,4,5]

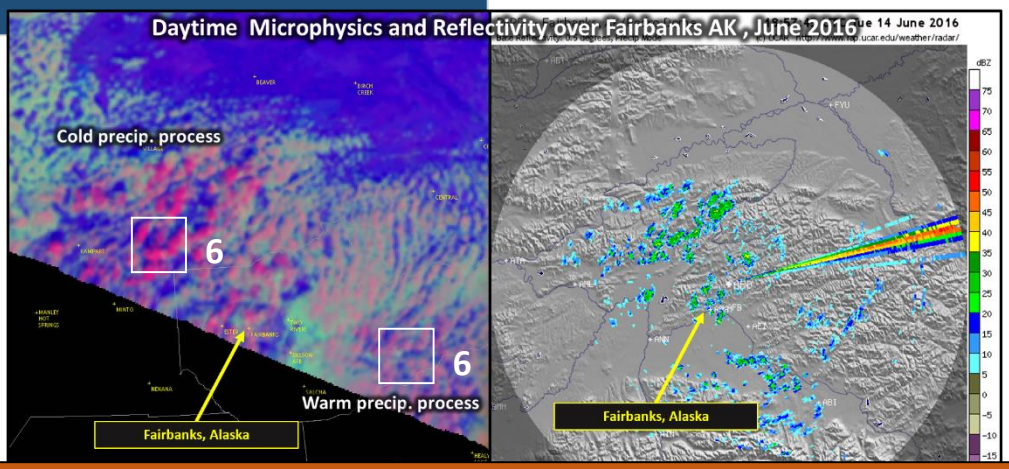
7 — Thick, small drops, low cloud
Stratus/Stratoculumus
(Bright green/blue) [1,2,4,5,6]

8 — Thin, small drops, low cloud
Fog and/or low stratus
(dull aqua to gray) [4,5,6]



Note:, colors may vary diurnally, seasonally, and latitudinally

References:
1) Rosenfeld/Lensky 2008: Clouds-Aerosols-Precipitation Satellite Analysis Tool (CAPSAT)
2) Rosenfeld/Lensky 1998: Satellite-based Insights into Precip. Formation in Continental/Maritime Convective Clouds
3) Schipper/Nietosvaara (EUMETrain), 2009: Operational use of RGBs (online training module)
4) Kerkmann/Rosenfeld (EUMETrain), 2004: Applications of MeteoSat Second Generation: The Day Microphysics RGB Product (training presentation)
5) Rosenfeld, 2013: Applications of MSG for insights into convective clouds (training presentation)
6) COMET, 2013: Multispectral Imagery: RGBs Explained



Complementary products: Rosenfeld (1998, 2008) describes the use of the DtMicro RGB to differentiate particle size and hence warm vs cold precipitation processes. The magenta represents a cold process while violet is warm, both at the same height.

Resources

UCAR/COMET
Multispectral Satellite Applications: RGB Products Explained.

NASA/SPoRT
Aviation Forecasting RGB Products

EUMETrain
RGB Interpretation Guide