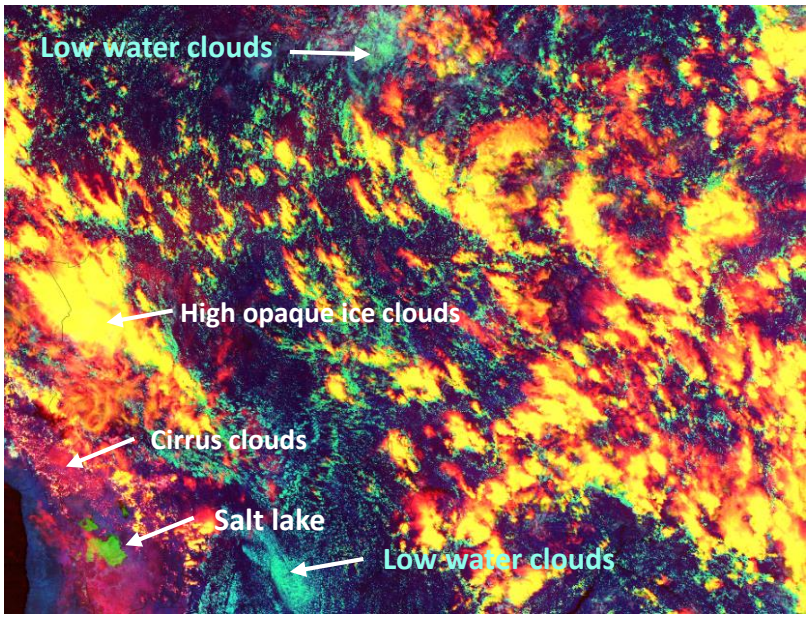
EUMETRAIN

Cloud Type RGB Quick Guide

The **Cloud Type RGB** will be a standard RGB created from the imager data (FCI) on board the future MTG satellites. It will use the 1.38 µm channel, which is new on FCI. In this Quick Guide, however, GOES-16 ABI band 4 (1.37 µm) is used as proxy for FCI. Currently, the VIIRS Cloud Type RGB can be used over Europe.

Primary aim: Cloud type differentiation (low and mid-level clouds, thin and thick high clouds, super-cooled water clouds)
Secondary aim: Thin cirrus detection
Main application period and area: Only during daytime; not usable at high satellite viewing angles or low solar angles.
Guidelines: The Cloud Type RGB combines information on **cloud optical thickness**, **cloud height** and **cloud phase** into one product. Because of the colour assignment chosen and colour enhancements performed, the cloud types appear clearly separated from each other.



Widespread convective activity over central Brazil,
ABI Cloud Type RGB from 5 February 2020 at 18:00 UTC

Background

The table below shows the FCI bands used in the Cloud Type RGB. The red channel (**NIR 1.38**) provides excellent detection of very thin **cirrus clouds** over land. This channel is located in a spectral region where strong absorption by water vapor occurs, so that low clouds and surface features are not detected in a moist atmosphere. The **optical depth** depends on the amount of water vapor in the upper troposphere. Hence, the signal strength in this channel reflects the **cloud height**. The green channel (**VIS 0.64**) represents the **optical thickness** of clouds. It also provides information on surface snow and sea ice. The blue channel (**NIR 1.61**) is a microphysical channel sensitive to the **ice and water phases**. At 1.61 µm, ice clouds usually have a low reflectivity (~ 30%), while water clouds strongly reflect (~ 60 – 70%) the incoming shortwave radiation. Additionally, this channel shows a weak dependence on cloud particle size. Ice clouds with very small ice crystals may be as bright as water clouds, and water clouds with very large droplets may be as dark as ice clouds.

Colour	Channel [µm]	Physically relates to	Small contribution to the signal of	Large contribution to the signal of
Red	NIR 1.38	Cloud height and optical depth	Low-level clouds	High clouds
Green	VIS 0.64	Cloud optical thickness	Thin clouds	Thick clouds Snow covered land Sea ice
Blue	NIR 1.61	Cloud phase	Thick ice clouds Snow covered land	Thick water clouds

Notation: NIR is near-infrared, VIS is visible, and the number is the central wavelength of the channel in micrometres.

Benefits

- It combines cloud height with cloud phase and cloud optical depth information.
- It effectively detects thin cirrus clouds over other clouds and cloud free land/sea.
- Snow and ice on the ground are clearly delimited from high-level (thin) ice clouds.
- It detects supercooled water clouds.
- It provides good colour contrast between cloud types.
- Coastlines and surface features are visible.

Limitations

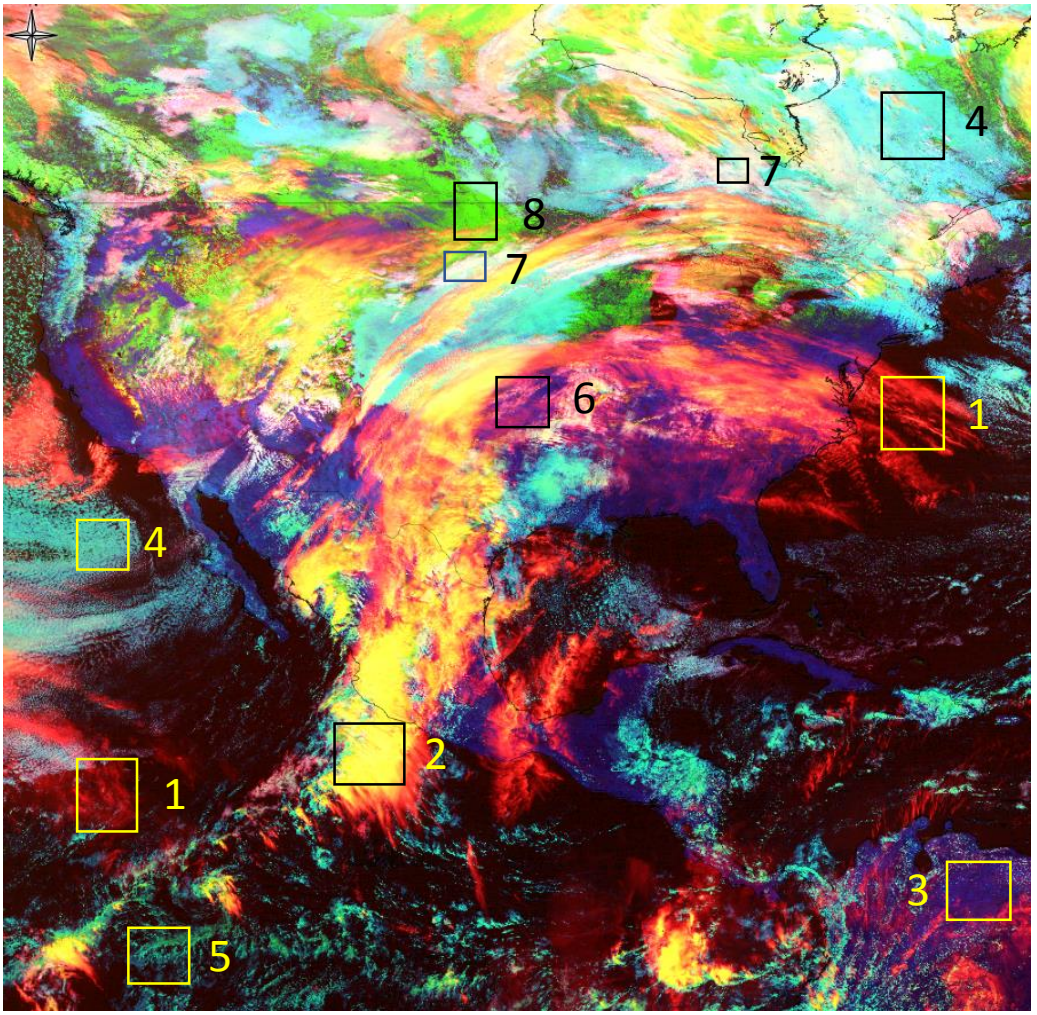
- Limited to daytime applications.
- The categories “high and low clouds” are rather coarse classifications.
- Less suited for particle size discrimination.
- Unable to detect thin cirrus over opaque high clouds.
- Small colour contrast between mid-level water and ice clouds.
- Snow has similar colour to low- and mid-level (ice) clouds.
- Mid-level thin clouds might not be detected in a moist atmosphere.
- Colour shades depend on atmospheric moisture.

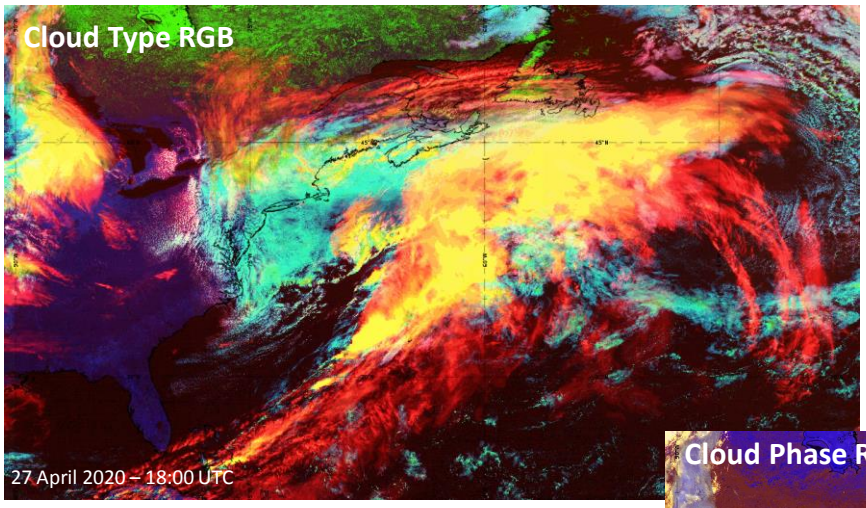
Cloud Type RGB
Quick Guide

Interpretation

- 1 — Thin cirrus clouds over land and sea (darker red over the seas)
- 2 — Thick ice clouds (multi-layered clouds with ice on top)
- 3 — Land
- 4 — Low to mid-level water clouds
- 5 — Mixed phase clouds (at low and mid-levels)
- 6 — High and thin water clouds (more orange if ice is present)
- 7 — Super-cooled water clouds
- 8 — Snow and ice on the ground

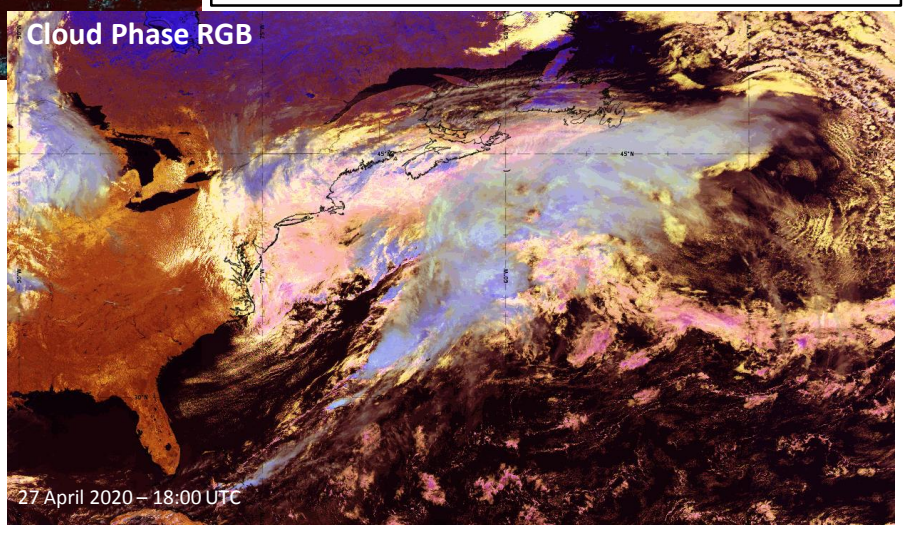
GOES-16 ABI sensor, North America, February 3, 2020, 18:00 UTC





Comparison between Cloud Type and Cloud Phase RGB

The **Cloud Type RGB** detects high and thin ice clouds (reddish colours) much better than the Cloud Phase RGB, due to the use of the 1.38 µm WV absorption channel.
The **Cloud Phase RGB** is better at differentiating water and ice phases (blue against pinkish/white) and cloud particle sizes (shades of blue) due to the combined use of two microphysical channels, 2.25µm and 1.61µm.



In the case of deep moist convection, the **Cloud Type RGB** offers the possibility to discriminate between the thick (towering cell) and the thinner (anvil) parts of the convective cloud (see the image on the reverse).
The **Cloud Type RGB** can be used in combination with the **Convection RGB,** which provides cloud microphysics information (particle size) to provide a more complete image of the convective cells.