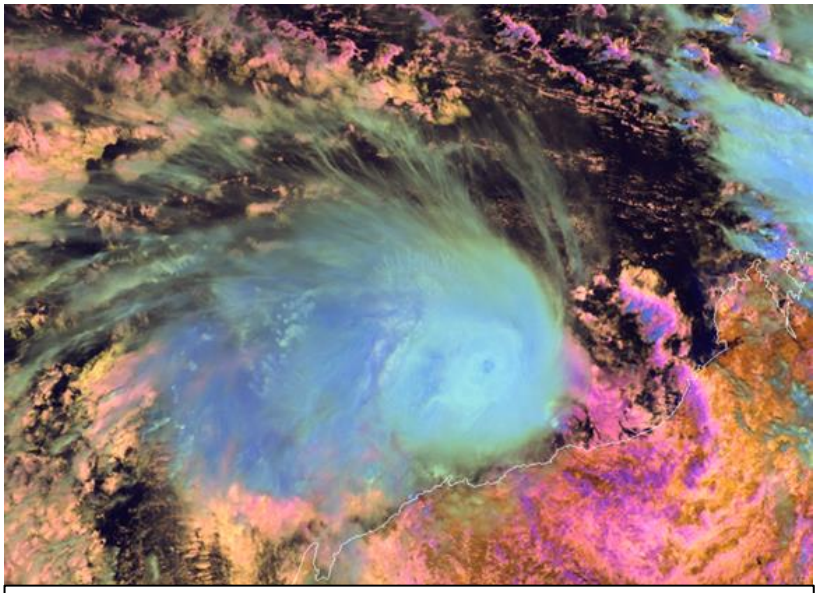
Cloud Phase RGB Quick Guide

Aim: Separation of water from ice clouds and information on cloud top particle size.
Area and time period of its main application: Low-, mid- and high-latitude regions, daytimes.
Applications and guidelines: It provides good quality microphysical information on cloud tops. It more reliably separates water from ice clouds than the present SEVIRI RGBs. However, phase detection of very thin clouds is still problematic in some cases. Dust, 24-hour Microphysics or the future Cloud Type RGBs may help to distinguish thin ice clouds from thin water clouds.
In the case of thick ice and water clouds it provides good colour contrast between cloud top regions covered by small and large particles.
It does not contain temperature information. Using it together with either the Day Microphysics RGB or an IR10.8 image might be useful.



Himawari AHI Cloud Phase RGB, NW coast of Australia, 08 February 2017, 02:30 UTC

Background

The table shows which channels are used in the Cloud Phase RGB. Both NIR2.25 and NIR1.6 are microphysical channels providing information on cloud top phase and particle size *in a different way*. ***Using them together*** enables a reliable separation between thick ice and water clouds. Note that the same channels are used for the red and blue colour beams as in Natural Colour RGB. While the latter has a separate focus on vegetation, the Cloud Phase RGB focuses mostly on cloud top microphysics.

Colour	Channel [µm]	Physically relates to	Smaller contribution to the signal	Larger contribution to the signal
Red	NIR1.6	Cloud Phase (and cloud top particle size)	Thick ice clouds	Thick water clouds
Green	NIR2.25	Cloud top particle size (and phase)	Thick clouds with large particles	Thick clouds with small particles
Blue	VIS0.67	Cloud optical thickness	Thin clouds	Thick clouds

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

Benefits

- It provides more reliable separation between thick ice and water clouds than the present SEVIRI RGBs.
- In the case of thick ice and thick water clouds it provides better separation between smaller and larger particles on top of the clouds. Thus, the colour contrast of thick ice clouds is higher than in the Day Microphysics RGB.
- The Cloud Phase RGB is useful for convection monitoring:
  - Cloud top glaciation is well seen in the developing phase.
  - The presence of small particles on (or above) mature mid-latitude, continental thunderstorm tops is an indicator of updraft intensity, thus possible severity.
- Most thick clouds have a good colour contrast versus the (snow free) surface features. Although the snow-covered surface and the ice clouds covered by large particles have similar colours (dark and medium blue), the snow is usually darker.

Limitations

- Limited to daytime applications.
- Separation of very thin water and ice clouds is problematic in some cases.
- It does not contain temperature information.
- The snow-covered surface and the ice clouds covered by large particles have similar colours (dark and medium blue).

Remarks

- Thin cirrus clouds not seen well because it does not use infrared channels.
- Small ice particles on the top of thick cloud do not always indicate a severe storm, nor a convective cloud.
- It is less sensitive to very thin above-anvil cirrus clouds than the Severe Storms RGB.
- The shades of colour partially depend on solar and satellite viewing angles.

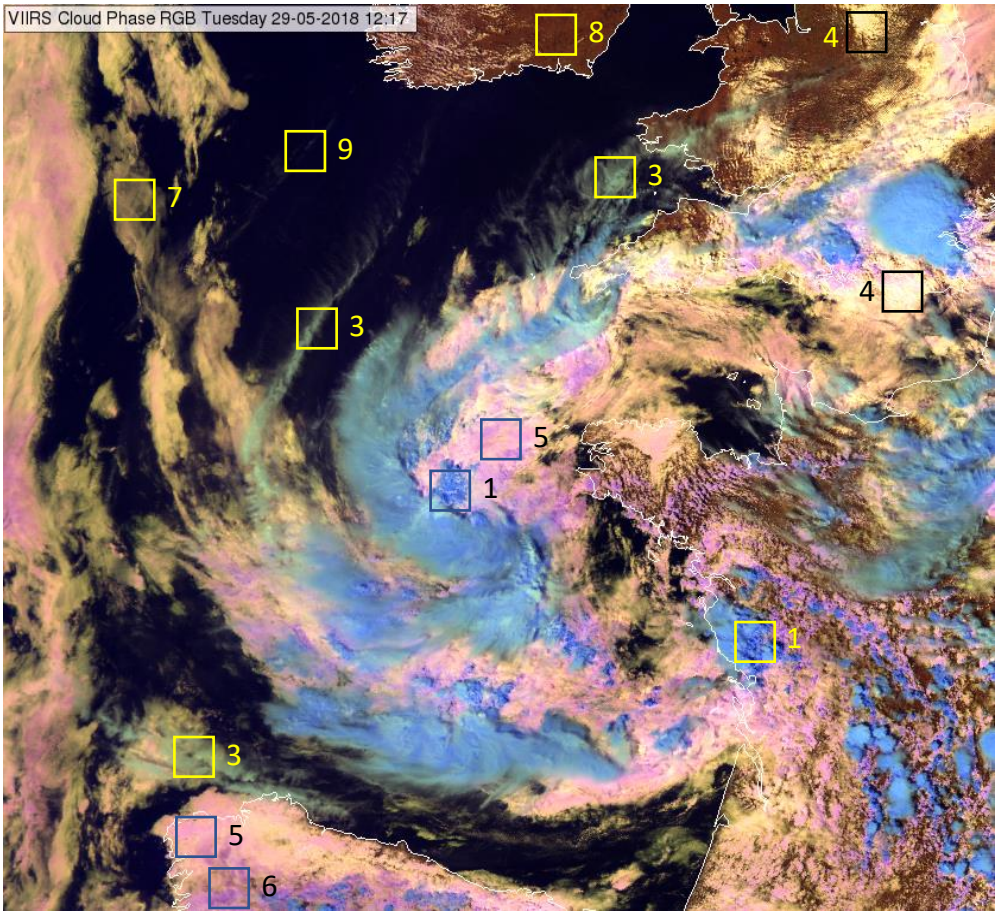
An extended guide to the Cloud Phase RGB is available on EUMeTrain webpage.

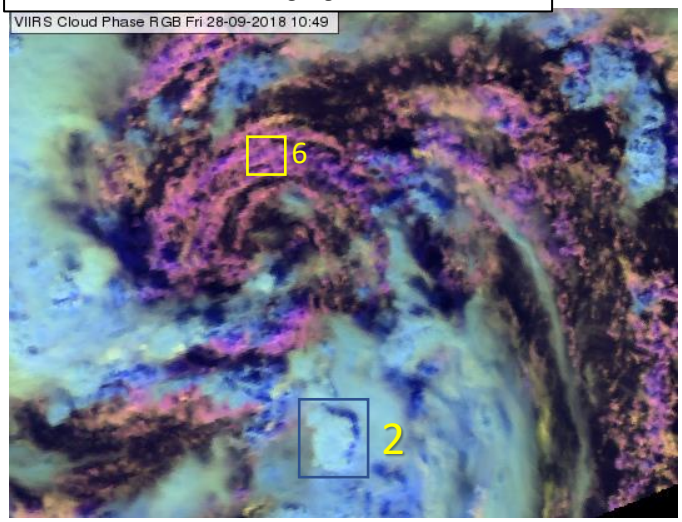
Cloud Phase RGB Quick Guide

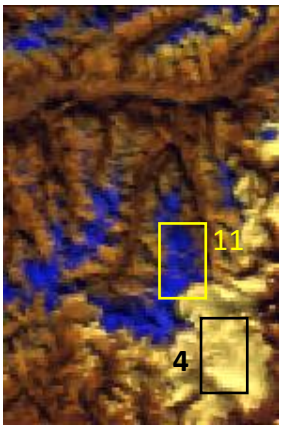
Interpretation

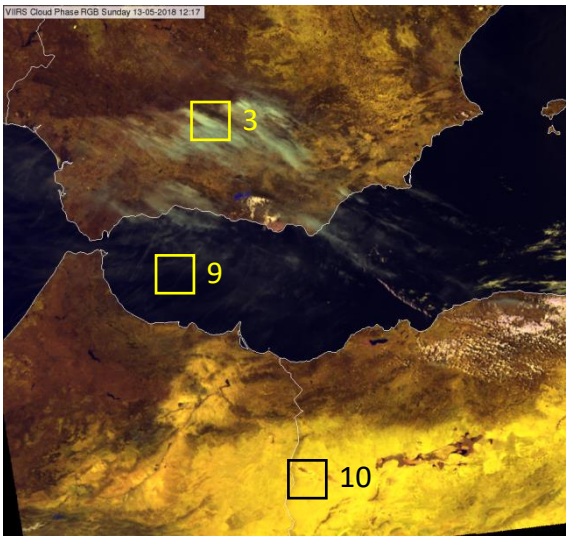
1	Thick ice clouds, large particles
2	Thick ice clouds, small particles
3	Thin ice clouds
4	Thick water clouds, small droplets
5	Thick water clouds, larger droplets (larger the droplets are darker pink)
6	Thick water clouds, extreme large droplets (or thick mixed phase clouds)
7	Thin water clouds over sea
8	Vegetated land (snow free)
9	Sea (ice free)
10	Desert
11	Snow on ground or sea ice

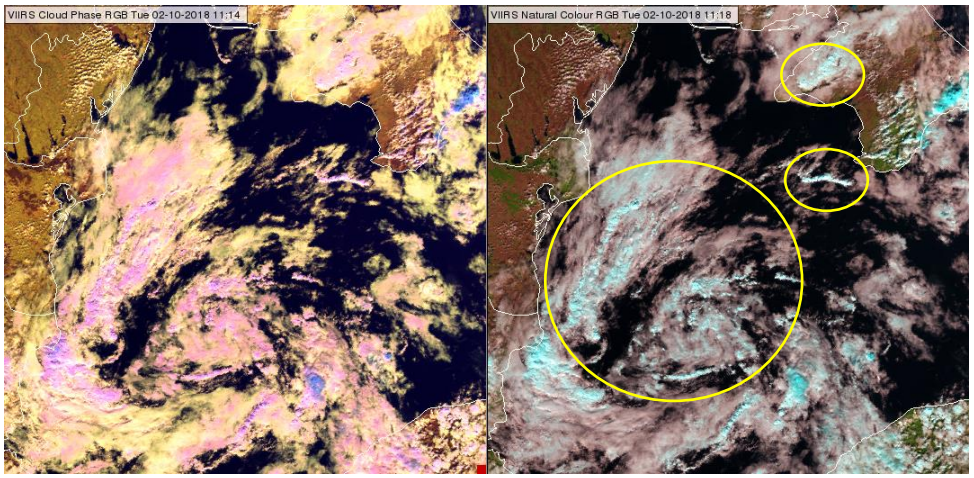
The colour of thin clouds depends on the cloud properties, its transparency, type of the underlying surface, satellite and viewing angles.











VIIRS Cloud Phase RGB (left) and Natural Colour RGB (right) 02 October 2018, 11:14 UTC

Comparison to other products

In the Natural Colour RGB (right) ice clouds are cyan, while water clouds are usually grey-white-pink. However, as the phase detection is based only on NIR1.6 channel the thick water clouds with large droplets seem to be similar to ice clouds (see the encircled cyan areas). In the Cloud Phase RGB (left) it is more evident that there are only few ice clouds in the image (blue patches), the other clouds are water clouds (pink and yellow).

More about RGBs on EUMeTrain.org
Contact: info@eumetrain.org;