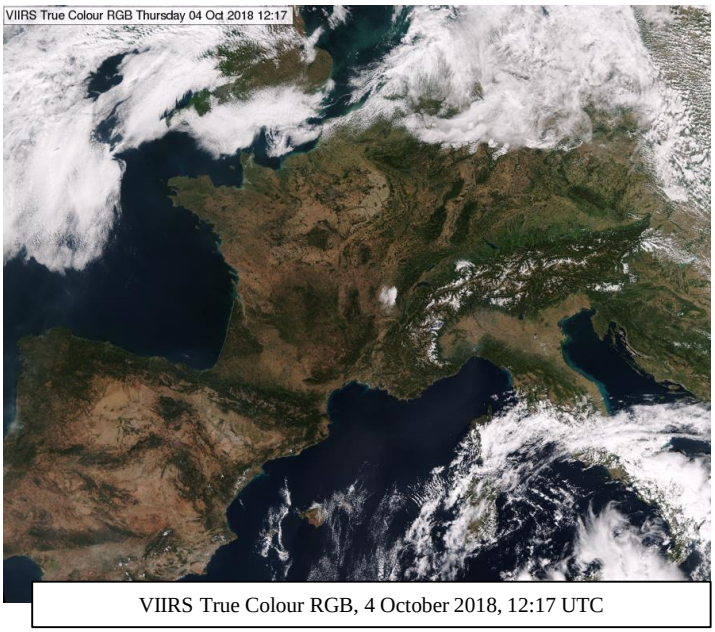
True Colour RGB
Quick Guide

The True Colour RGB will be a standard RGB, which will be created from the imagers (FCI) on the future Meteosat Third Generation satellites. In addition to the 0.6 µm channel it also uses the 0.4 and 0.5 µm channels which will be new on FCI. In this Quick Guide VIIRS and MODIS images are used as proxy data for the future FCI.

Aim: Monitoring: aerosols; suspended particles and algae bloom in sea water; surface features and providing true colour images.
Area and time period of its application: Full disk, daytime.
Applications and guidelines: Colours are close to those naturally observed. Surface features can be identified: green/dry vegetated areas, deserts, oceans, snow/ice covered areas. It does not differentiate between cloud types, only the optical thickness. Clouds and snow/ice have similar colours (bright white). Their different structures (and movement) may help to distinguish them.
Aerosols can be identified and differentiated from clouds (different structure, slightly different colour shades). Sometimes the aerosol types (dust, volcanic ash, fire, smoke) can also be recognised.
Deep, clean water bodies can be well distinguished against water that is rich in suspended matter or that is shallow, with sediments on the water floor (dark blue against greenish or bluish cyan, or brown). Algae blooms are also seen, in greenish and bluish cyan.



VIIRS True Colour RGB, 4 October 2018, 12:17 UTC

Background

The True Colour RGB was designed to provide natural colours. The channels sensitive to the red, green and blue visible light are visualised in the respective colour beams. This results in realistic colours that imitate how the human eye might see the scene. Before creating the RGB the effect of the Rayleigh scattering has to be removed from each band, otherwise the RGB would be blurry. Aerosols are better seen in this RGB than in the other shortwave standard RGBs as the scattering effect is stronger at shorter wavelengths. The table below shows which VIIRS channels are used in creating the True Colour RGB. GOES/ABI does not measure in green spectrum region, it must be simulated. For Himawari/AHI the green channel (VIS0.51) is slightly shifted compared to the Chlorophyll-A visible reflectance peak, so it is combined with the NIR0.86 channel to gain enough green shades for vegetation imaging. The NIR0.86 combination will also be needed for FCI.

Colour	Channel [µm]	Physically relates to	Smaller contribution to the signal	Larger contribution to the signal
Red	VIS0.67	Cloud optical thickness, vegetation, aerosols	Thin clouds	Thick clouds
Green	VIS0.56	Cloud optical thickness, vegetation, aerosols	Thin clouds Dry vegetation	Thick clouds Green vegetation
Blue	VIS0.49	Cloud optical thickness, vegetation, aerosols	Thin clouds	Thick clouds

Notation: VIS: visible, number: central wavelength of the channel in µm (for VIIRS).

Benefits

- Similar to colour photography. Easy to interpret. Understandable by all.
- Useful for: geological and land-use analysis; green vegetation monitoring.
- Aerosols are easily seen. Aerosols and water/ice clouds are usually distinguishable due to their different structures and colours.
- Ash, smoke and dust may have different colour shades.
- Helps fire detection and monitoring as smoke is visible in the RGB. It should be used together with other information, for example with the Fire Temperature RGB, Day/Night Microphysical RGBs and/or the IR3.8 channel.
- Sediment or algae blooms are sometimes seen in water bodies.
- Provides information on cloud optical thickness.
- Thin low level clouds are well seen over seas.

Limitations

- Works only during the day.
- No separation between clouds and snow.
- No separation of cloud types.
- No temperature information.
- No cloud height information.
- No microphysical information for clouds.
- Strong sunglint.

Remark

Thin cirrus clouds are less visible, as the True Colour RGB lacks infrared channels.

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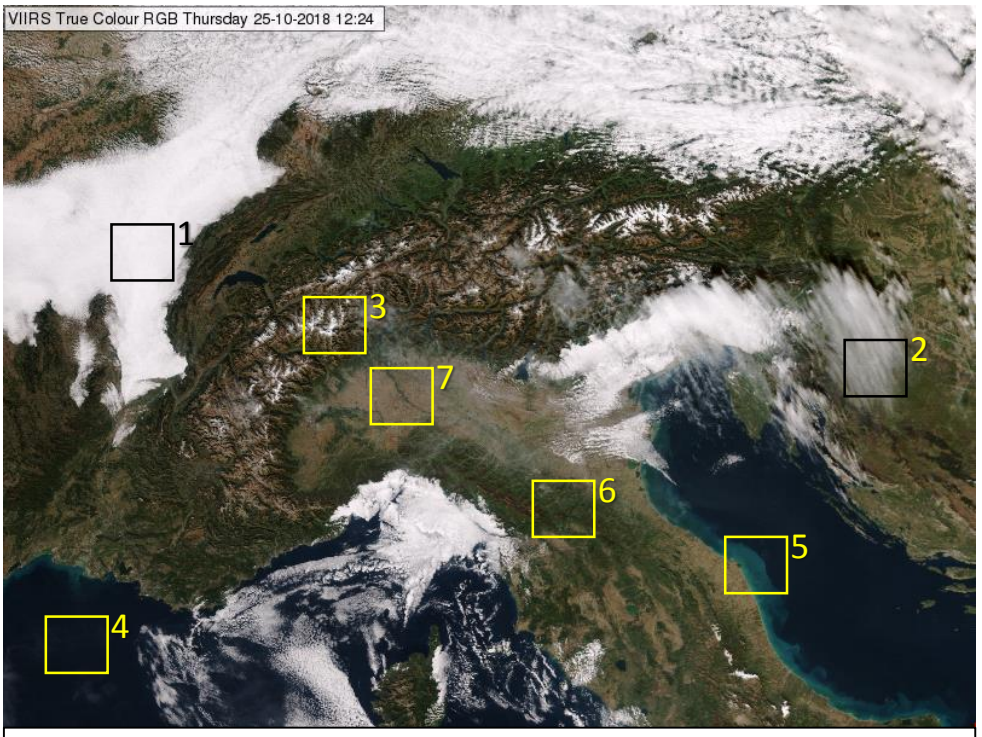
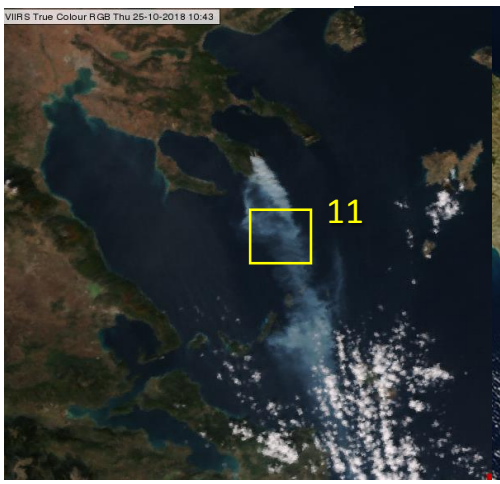
Interpretation

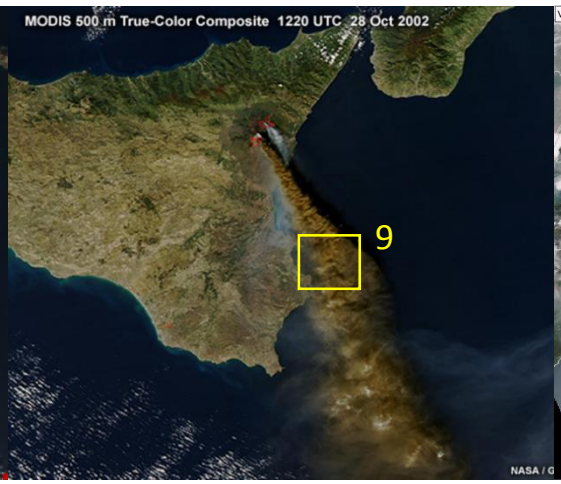
1	Thick clouds
2	Thin clouds over ground/sea
3	Snow on ground or sea ice
4	Deep water not rich in suspended matter (dark blue, almost black)
5	Water rich in suspended matter (greenish or bluish cyan)
6	Land with lots of green vegetation
7	Land with little green vegetation
8	Desert
9	Volcanic ash (brown or brownish grey)
10	Smog, pollution, or haze (grey)
11	Smoke (grey with some bluish tone)
12	Dust (grey with some brownish tone)

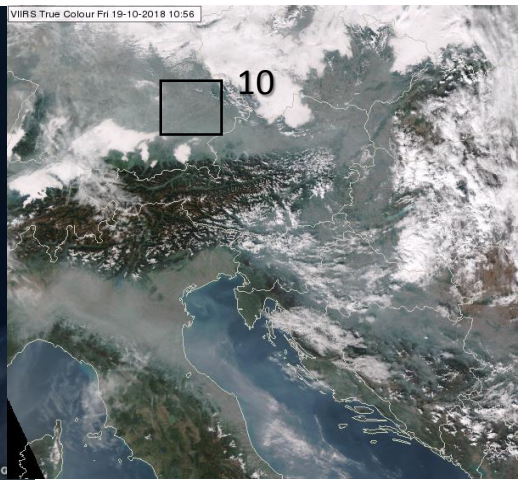


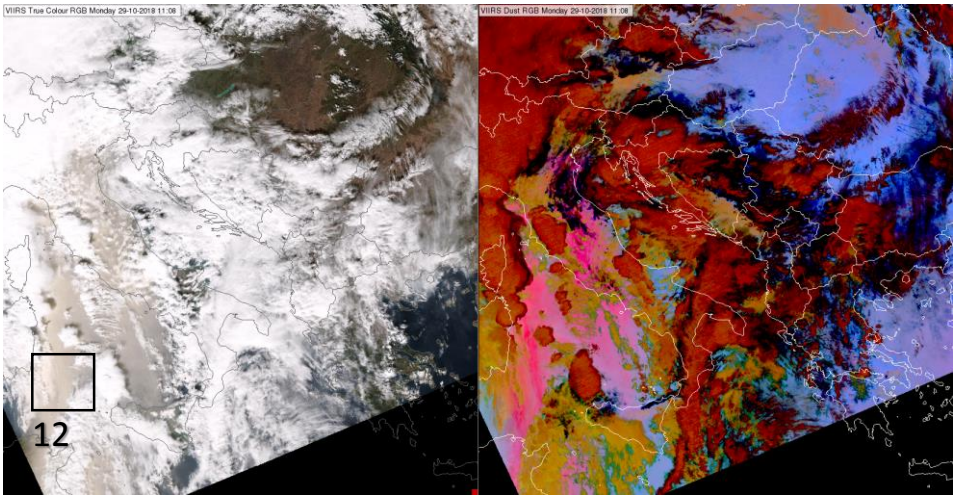
VIIRS True Colour RGB, 25 October 2018, 12:24 UTC

Remark: Colours depend on solar and satellite viewing angles. The colours of the aerosol clouds depend on several factors, for example on the composition, e.g. oil smoke is black due to more soot particles. The structure of a well spread aerosol layer (like haze) has a washed-out appearance. A new smoke or volcanic ash cloud has a plume shape.









VIIRS True Colour RGB (left) and Dust RGB (right), 29 October 2018, 11:08 UTC

Comparison to Dust RGB

The image pair on left shows water, ice and dust clouds. Dust is seen in the holes between the clouds over the Tyrrhenian Sea and in mid-Italy (see the pink colour in Dust RGB). The features have higher colour contrast in the Dust RGB, but the colours are more natural in the True Colour RGB. The structure of lofted dust and water/ice clouds are different: dust is much more smooth and homogeneous. Colour contrast is low in the True Colour RGB: water and ice opaque clouds are white, thin clouds are grey. Lofted dust appears grey with some brownish shade.

More about RGBs on EUMeTrain.org
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