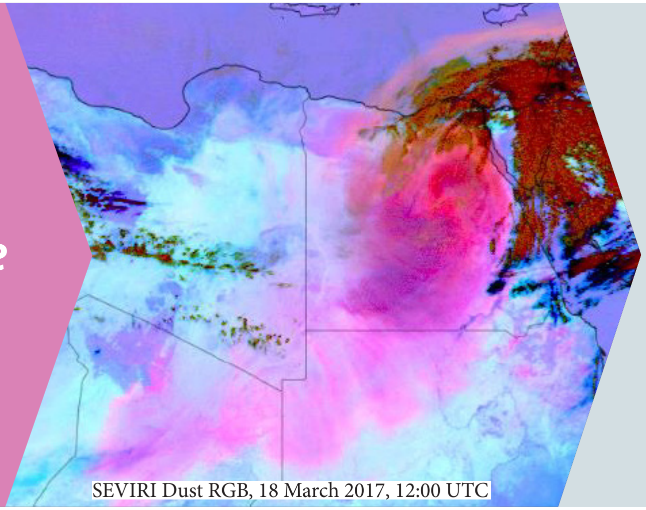
EUMeTrain

SEVIRI **Dust** RGB

Quick Guide



SEVIRI Dust RGB, 18 March 2017, 12:00 UTC

Primary aim

Detection of **dust** in the atmosphere.

Time period and area of its main application:

Day and night throughout the year.

Guidelines

The **Dust RGB** is identical to the 24-hour Microphysics and to the Ash RGB as far as the involved channels are concerned, except that the temperature ranges have been tuned for the detection of **dust clouds**. Although the Dust RGB does not provide information on height and concentration, it provides excellent temporal resolution and colour contrast, day and night. Because it works over deserts, we can follow its movement back to the dust source. It also detects **water vapor boundaries** in lower atmospheric levels. It depicts **thin and thick ice clouds** (e.g. cirrus clouds versus cumulonimbus clouds), and thin and thick **mid-level water clouds**. The colours of the cloud-free areas in the Dust RGB vary strongly with surface temperature, thus from night to day, and from winter to summer.

Secondary aims

Identification of **high level cirrus clouds** and low level **moisture boundaries**, distinguishing water clouds from ice clouds. Further on it also allows the detection of volcanic ash and SO_2 plumes.

Background

The **Dust RGB** makes use of the three **window channels** of MSG. This RGB has been primarily tuned for dust detection, but it is able to detect other cloud types as well. The **IR12.0–IR10.8** difference (red colour beam) helps to distinguish dust from ice and water clouds. The red signal is high for dust, low for thin cirrus clouds and medium for all other cloud types. Additionally, this difference helps to identify thin (mid- and high-level) clouds and provides visual information on low-level moisture boundaries in cloud-free areas. The **IR10.8–IR8.7** difference (green colour beam) helps distinguish dust clouds from the cloud-free desert surface. It also distinguishes ice from water clouds. The blue signal (IR10.8) depends on the thickness and temperature of the dust cloud (and on the temperature of the underlying surface). The magenta colour of dust clouds over warm land results from a high blue contribution. The blue signal also distinguishes thick water from ice clouds according to their top temperature.

Colour	Channel (mm)	Physically relates to	Smaller contribution to the signal of	Larger contribution to the signal of
Red	**IR12.0–IR10.8**	Cloud optical thickness Thin dust	Thin ice clouds	**Dust**
Green	**IR10.8–IR8.7**	Cloud phase	Thin ice clouds **Dust**	Water clouds Deserts
Blue	**IR10.8**	Temperature	Cold clouds	Warm surface Warm clouds

Notation: IR: infrared; channel number: central wavelength of the channel in micrometer.
Remark : The channel combination is the same as for the Ash and the 24-hour Microphysics RGBs, but the tunings are different (not shown here).

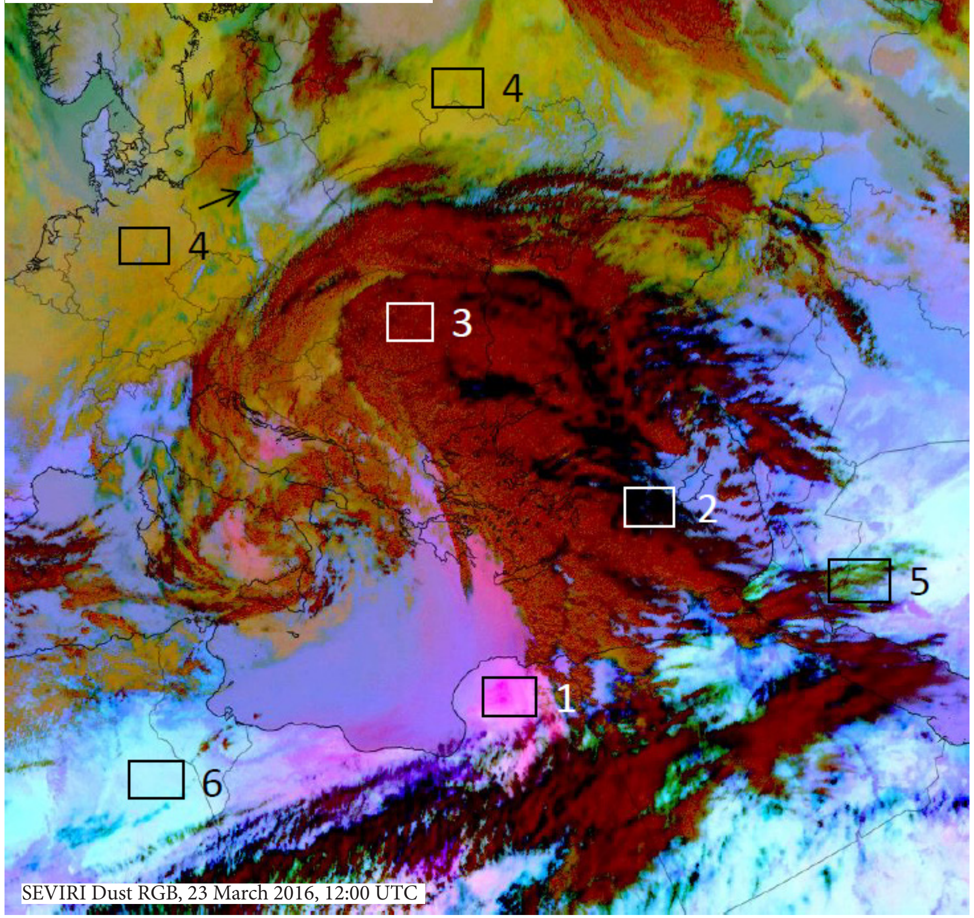
Benefits

- The Dust RGB is available day and night.
- Allows for monitoring of the displacement of a dust clouds at high temporal resolution.
- The Dust RGB is best suited for thin cirrus cloud detection.
- Allows water clouds to be distinguished from ice clouds.
- Allows for detection of water vapour boundaries in the lower troposphere.
- Good colour contrast between thin and thick midlevel clouds and between thin and thick ice clouds.

Limitations

- It is not possible to determine the height nor the concentration of the dust cloud in the atmosphere from the Dust RGB alone.
- It isn't possible to deduce the visibility on the ground.
- The typical magenta colour of dust in the atmosphere is not visible when clouds obscure the scene.
- Thin or low level dust clouds over the sea are difficult to detect. Solar imagery should be used in this case (e.g. Natural Colour RGB).
- Very thin (low concentration) dust clouds are not detected by the Dust RGB.
- Low clouds are not well seen in the Dust RGB.

Colour interpretation

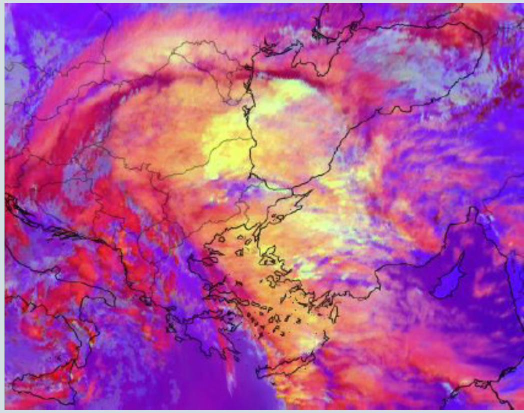


SEVIRI Dust RGB, 23 March 2016, 12:00 UTC

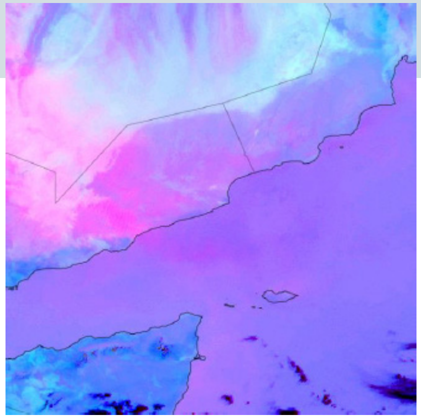
SEVIRI **Dust** RGB

QG

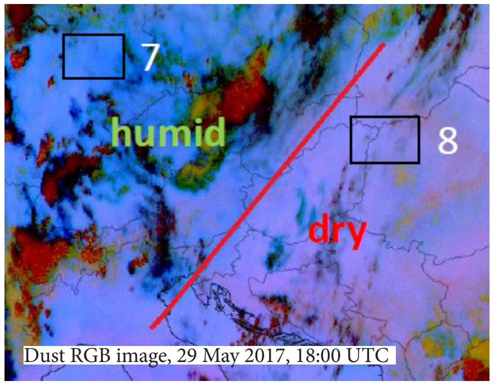
Comparison to other RGBs



Dust in cloud-free regions is depicted in magenta by the Dust RGB. Inside clouds, the presence of dust particles acts as cloud condensation nuclei and generates small ice crystals which can be seen in the Severe Storms RGB (bright yellow colour). **Sev. Storms RGB, same date as upper right image.**



The comparison of the Dust RGB with the Natural ColourRGB shows that the latter better resolves low dust clouds over the sea due to higher reflectivity of dust particles compared to the sea (high contrast). Over land, the situation is reversed. Because of the high reflectivity of sand for shortwave solar radiation, the contrast between dust cloud and land is poor in the Natural ColourRGB. **Natural ColourRGB (left) and Dust RGB (right) from 1 June 2017, 12:00 UTC.**



Dust RGB image, 29 May 2017, 18:00 UTC

1	Dust or ash clouds. The colour of dust clouds varies from pink to violet, ash clouds are more reddish.	5	Thin cirrus clouds over deserts appear green.
2	Cirrus clouds with no clouds below are black or dark blue.	6	Hot sandy deserts, dry air mass.*
3	Thick, high and cold ice clouds	7	Humid air in lower levels.* (~ 700 hPa)
4	Thick mid-level clouds. Thin mid-level clouds appear green (black arrow).	8	Dry air in lower levels.*

** Colours can vary considerably depending on surface temperature.*

Upper image: Low level humidity gradients can be observed in the Dust RGB in form of a colour gradient from **darker blue** (humid air mass) to a more **pinkish blue** (dry air mass).