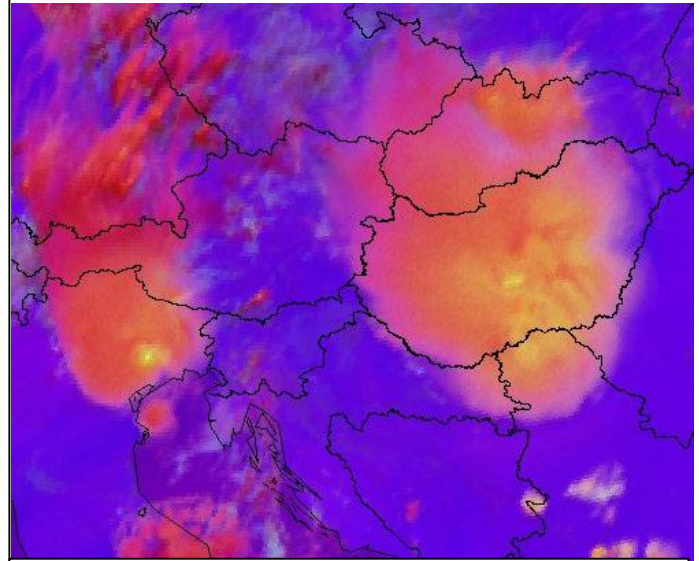


SEVIRI Severe Storms RGB Quick Guide

Primary aim: Monitoring of convection
Secondary aims: Monitoring (the cloud top microphysics) of high clouds
Time period and area of its main application: Daytime, in convection season at low- and mid-latitudes, although different tunings/versions should be used for low- and mid-latitudes.
Guidelines: Ice clouds has usually large ice crystals on their top. For the mid-latitude continental storms the presence of small ice crystals on (or above) the cloud top and/or very cold cloud top temperature is indicator of possibly severity. This RGB was tuned to highlight such high clouds, and it do this with excellent colour contrast.
 However, one has to be careful at using this RGB, to interpret it well. Non-convective clouds can also consist of small ice crystals. Small ice crystals can be present on a convective cloud top without strong updraft.



SEVIRI Severe Storms RGB for 29 June 2006, 12:25 UTC

Background

The table shows which channel differences are used in this RGB type, and lists some of the land and cloud features which have typically low or high contribution to the colour beams in this RGB. (WV6.2 - WV7.3) is used to highlight high-level clouds. (NIR1.6 – VIS0.6) is used to separate ice from water clouds. (IR3.9 - IR10.8) is used to highlight those cloud tops which are covered by small ice crystals and/or which are very cold.

Colour	Channel [μm]	Physically relates to	Small contribution to the signal of	Large contribution to the signal of
Red	WV6.2 - WV7.3	Cloud top height	No mid or high clouds	High-level clouds
Green	IR3.9 - IR10.8	Cloud top particle size and temperature	Opaque ice cloud with large cloud top particles and/or not very cold cloud top temperature	Opaque ice cloud with small crystals and/or very cold cloud top temperature
Blue	NIR1.6 – VIS0.6	Cloud top phase	Thick ice clouds	Water clouds Land, sea surface

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

Benefits

- It highlights with excellent colour contrast those high clouds which cloud top is very cold and/or covered by small ice crystals.
- It helps to identify intense updraft that indicate strong convection in case of mid-latitude, continental convective clouds.

Limitations

- It works only during daytime.
- Pixel colour fades during dawn/dusk when the sun angle is low.
- The 'yellow colour' is a common effect of small ice crystals and cold cloud top temperature.
- It was not designed to provide full cloud analysis - This high clouds oriented RGB contains (hardly) no information about lower level clouds and surface.
- Snow covered land might have similar colour as high clouds with large crystals.
- One has to be careful at using this RGB, to interpret it well. Non-convective clouds can also consist of small ice crystals. Small ice crystals can be present on a convective cloud top without strong updraft.

Good to remember:

- Small particles on the top of a convective cloud do not necessarily indicate strong updraft
 - Continental convective cloud with cold cloud base has usually small ice crystals on the top – without strong updraft
 - Highly polluted convective cloud (like pyro Cb) has usually small ice crystals on the top – without strong updraft
- There are some (non-convective) ice cloud types which consist of small ice crystals, like high-level lee clouds or highly polluted cirrus clouds (e.g. dust carried aloft can lead to long lived small ice particles).

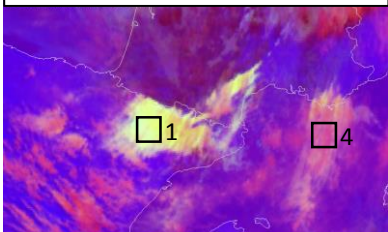
SEVIRI Severe Storms RGB Quick Guide

Interpretation

- 1** Thick ice cloud with small ice crystals on the top and/or very cold cloud top (Shades of yellow)
- 2** Thick ice cloud with large ice crystals on the top and/or not very cold cloud top (Shades of red)
- 3** Thin ice cloud with large ice crystals (Shades of pink/violet depending on the transparency)
- 4** Thin ice cloud with small ice crystals (Shades of mauve depending on particle size and cloud transparency)
- 5** Super-cooled water cloud (Greyish with some green-yellow shades if very cold)
- 6** No mid or high cloud (Shades of blue or magenta)

Surface is not seen, low clouds are not or hardly seen. Colours depend on solar and satellite viewing angles, fading with low solar elevation.

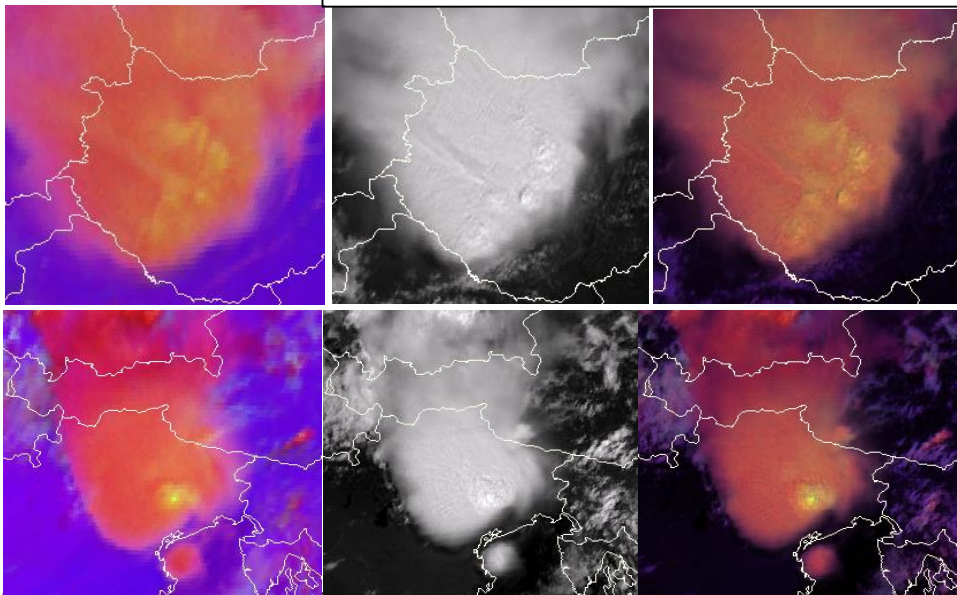
Severe Storms RGB image for 17 May 2007, 09:40 UTC



High level lee clouds consist of very small ice crystals.

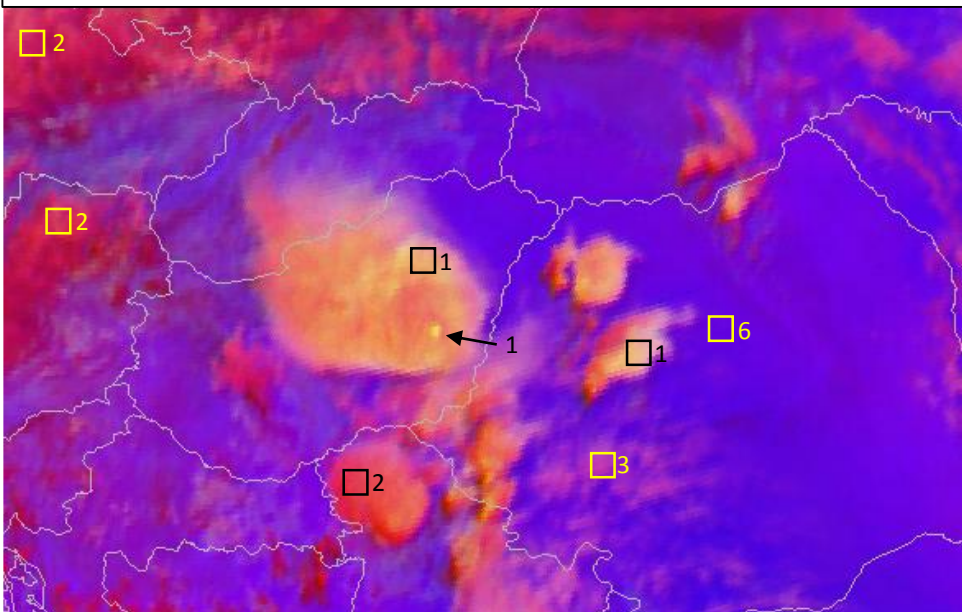
Comparison to other products

The images below show Severe Storms RGB and HRV images separately and ,together': the third column shows blended images composed by the two.

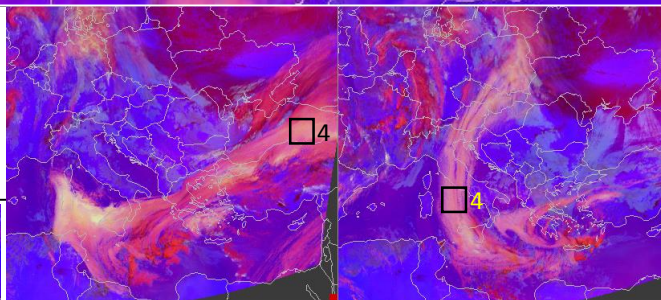


Severe Storms RGB (left), HRV (middle), HRV/Severe Storms RGB blended (right) images, 29 June 2006, 10:10 (up) and 12:25 (bottom) UTC

SEVIRI Severe Storms RGB for 20 May 2008 14:25 UTC



Right: Severe Storms RGB images for 23 (left) and 24 (right) February 2007, 10:55 UTC
Below: Severe Storms RGB and Dust RGB (in the corner) for 22 February 2007, 12:00 UTC



Highly polluted clouds consist of small particles, because of the many condensation nuclei. The image on the left shows a cyclone polluted by dust (see the Dust RGB in its corner indicating dust cloud by pink colour). The two upper images were taken on the next two days showing remains of the cyclone cloudiness - thin cirrus clouds with very small ice crystals (in mauve shades).

Useful links:

- [MSG Interpretation Guide](#)
- [EUMeTrain Training Module](#)
- [RGB Colour Interpretation Guide](#)
- [NASA SPORT COMET module](#)

In the HRV image one can see cloud top features, like overshooting tops, ice plume. In the blended image one can exactly see, which cloud top features are yellow(ish).

In the bottom row the yellow overshooting top indicates strong updraft.

In the upper row the overshooting tops are yellow, the ice plume is slightly yellowish, and other part of the anvil are also yellowish.

Strong updrafts often bring small ice particles up to the cloud top. The water particles formed at the cloud base have not much time to become larger by coagulation before freezing. Small particles coming up from the updraft spread along the anvil.

Small ice crystals may belong to an above anvil cirrus cloud as well, like Pileus or ice-plume. They are also indicators of strong updraft.