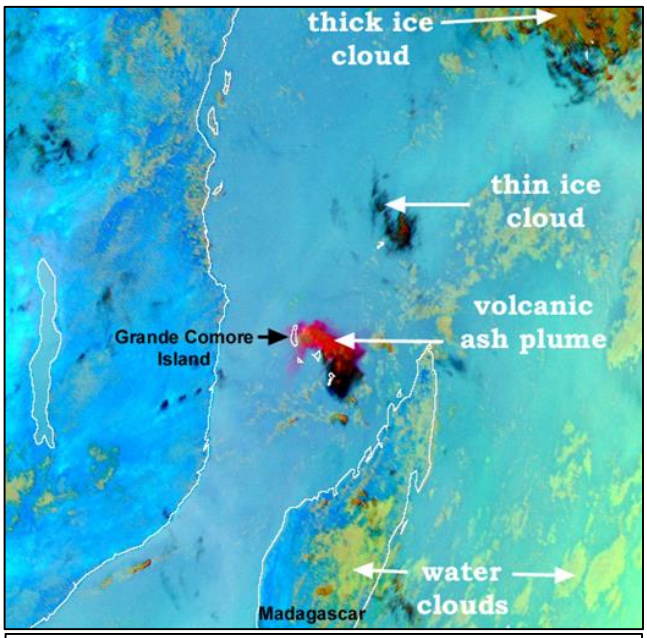
SEVIRI Ash RGB Quick Guide

Aim: **Detection of volcanic ash and SO_2 gas**.
Time period and area of its main application: In case of volcanic eruption.
Guidelines: Optically **thin ash cloud** can be well detected and clearly distinguished from ice and water clouds in the Ash RGB images. Optically t**hick ash clouds** look like thick ice clouds. However, the volcanic ash becomes rapidly optically thin. **Pure SO_2 gas plumes** can be better detected at low satellite viewing angles closer to the sub-satellite point than, for example, London or Copenhagen.
In the case of **very low concentrations**, ash and SO_2 gas might be not seen from geostationary satellites, only by the sounding instruments of polar orbiting satellites. The Ash RGB does not provide information on height and concentration, but does provide high temporal resolution.
Volcanoes also inject **water vapour**, which becomes cirrus cloud when reaching a height.
Note that higher level SO_2 plumes are detected by the Airmass RGB as well.



Volcanic ash ejected by Karthala volcano, Comoros
SEVIRI Ash RGB, 25 November 2005, 08:00 UTC

Background

The table shows which channels (or channel differences) are used in the Ash RGB and lists some of the land and cloud features which make typically low or high contribution to the colour beams in this RGB. Thin volcanic ash is separated from water and ice clouds by the **IR12.0–IR10.8** channel difference. SO_2 gas is detectable due to its absorption band at 8.7 µm.

Colour	Channel [µm]	Physically relates to	Smaller contribution to the signal of	Larger contribution to the signal of
Red	IR12.0–IR10.8	Cloud optical thickness	Thin ice clouds	Thin volcanic ash
Green	IR10.8–IR8.7	Cloud phase	Ice clouds thin volcanic ash	SO_2 gas plume Water clouds
Blue	IR10.8	Temperature	Cold clouds	Warm surface Warm clouds

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

Benefits

- It works during the day and at night. (This allows for the creation of long animations.)
- Different colours for thin volcanic ash, SO_2 gas plume and cirrus clouds (and for the mixture of ash and SO_2 gas).
- Thin volcanic ash has good colour contrast against water and ice clouds and surface features.
- SO_2 gas plume has good colour contrast against ice clouds and surface features, but close to the limb water clouds might have similar colour as pure SO_2 plume – see limitations.
- The colours of the water and ice clouds and the surface are similar (paler) to their colours in the Dust/24-hour Microphysics RGBs.

Limitations

- Lower-level volcanic ash and SO_2 gas plume can be covered by higher-level clouds.
- Very thick ash clouds cannot be discriminated from ice clouds.
- If volcanic ash and/or a SO_2 gas plume is mixed with cirrus cloud identification might be problematic.
- The colours greatly depend on the satellite viewing angle. The colour of the water clouds changes to green towards the limb. Thus, pure **SO_2 gas plumes** can only be easily separated from water clouds at low satellite viewing angles closer to the sub-satellite point (zero latitude and longitude) than, for example, London or Copenhagen. In the case of high satellite viewing angles the Dust RGB is more appropriate for SO_2 detection.

EUMETRAIN

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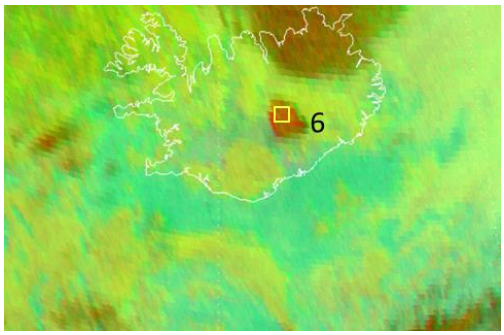
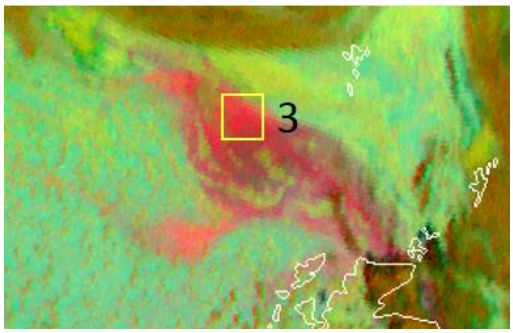
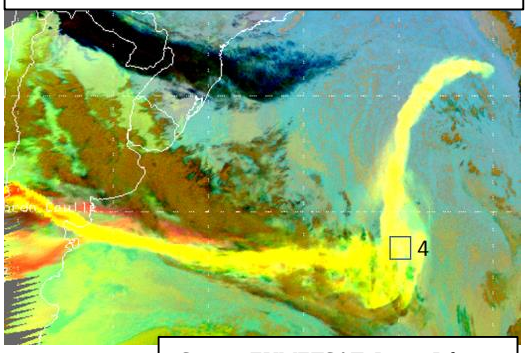
Thick ash cloud over Iceland
21 May 2011, 20:10 UTC



Thin ash cloud originated from Iceland
24 May 2011, 03:10 UTC



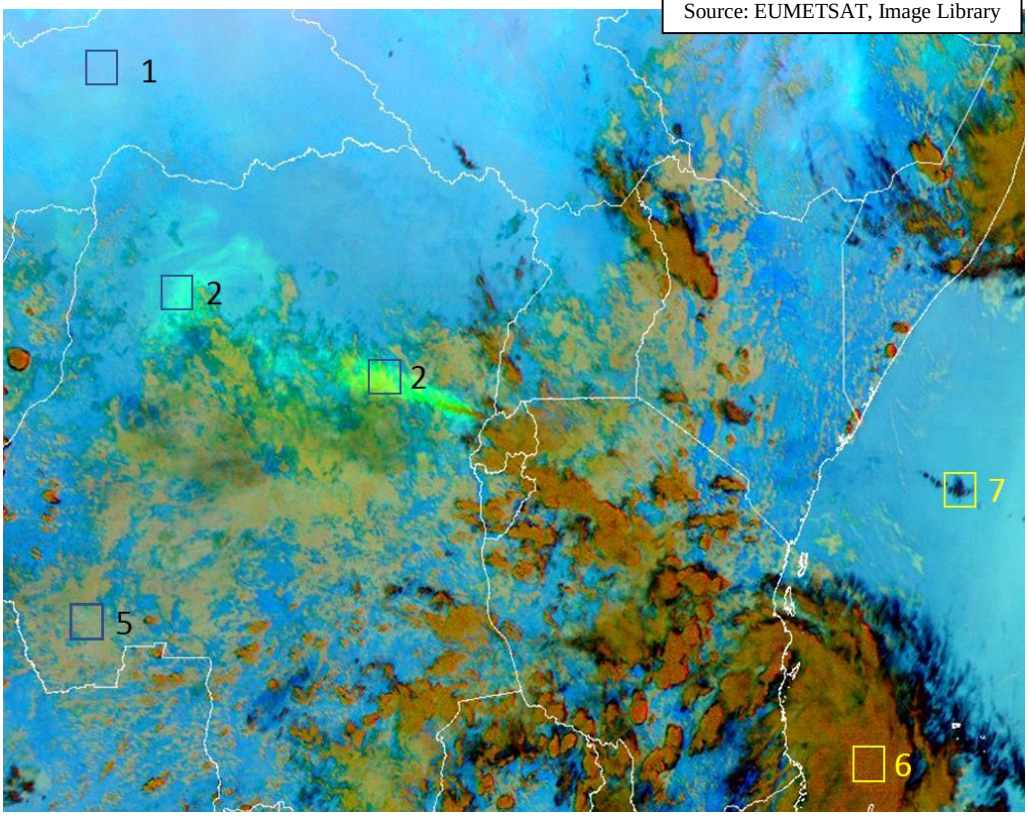
Mixed ash and SO_2 originated from Chile
06 June 2011, 12:00 UTC



Source: EUMETSAT, Image Library

Interpretation

1	Cloud free land (Shades of blue or pink depending on the temperature and water vapour content)
2	SO_2 gas plume (Shades of bright green depending on the concentration)
3	Thin volcanic ash (Shades of red depending on the concentration)
4	Mixed ash and SO_2 gas (Shades of yellow depending on the concentrations)
5	Water cloud (Shades of greyish tan)
6	Thick ice cloud or Thick volcanic ash cloud (Shades of brown)
7	Thin ice cloud (Shades of dark blue depending on the transparency)



SO_2 plume ejected by the Nyamuragira volcano, Congo
SEVIRI Ash RGB, 29 November 2006, 11:10 UTC

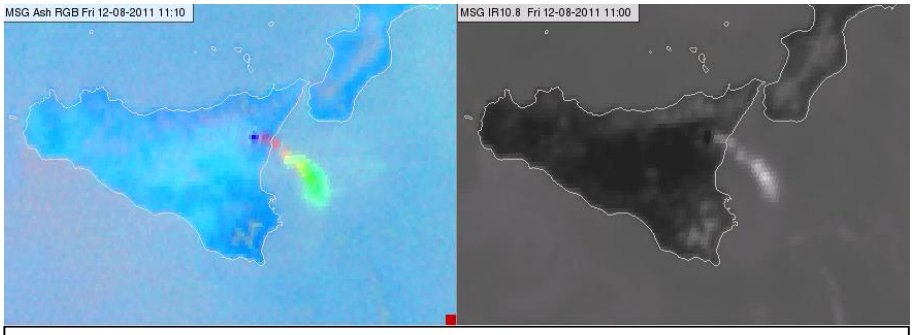
Colours may depend on viewing angle, concentration, cloud transparency, temperature, surface emissivity and water vapour content

The Ash RGB is created following the EUMETSAT recommended recipe. Using different ranges and/or gamma corrections will modify the colours.

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

Comparison to other products

In the Ash RGB one can see both the ash (red/magenta) and the SO_2 gas plume (green). In the IR10.8 image one cannot see the SO_2 gas plume at all. In the IR10.8 image one can see the volcanic ash plume, but one can not distinguish it from water or ice clouds.



Volcanic eruption of Mount Etna in Sicily. Ash RGB (left) and IR10.8 (right) images, 12 August 2011, 11:10 UTC