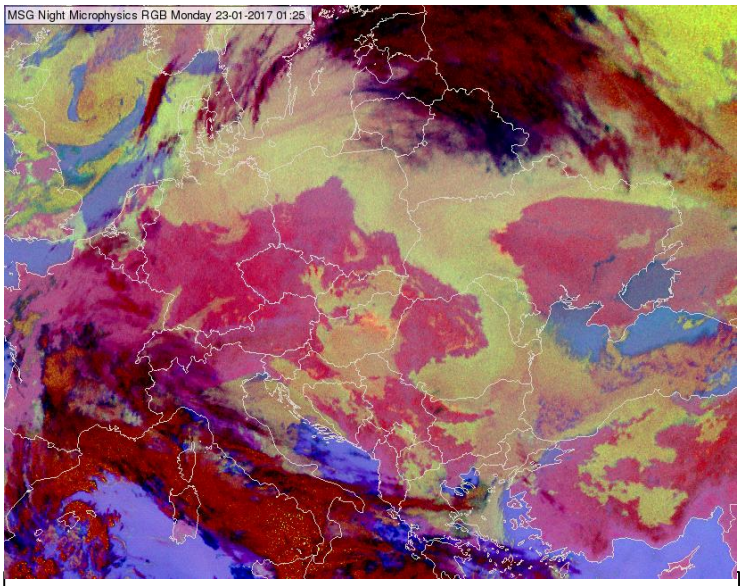
# SEVIRI Night Microphysics RGB Quick Guide

Primary aim: **detection of fog/low clouds** at night
Secondary aims: provide **full cloud analyses** at night and fire monitoring
Time period and area of its main application: low- and mid- and high-latitudes, at night. In cold winter situations, the 24-hour Microphysics RGB is more useful.
Guidelines: It provides the **best colour contrast** between fog/low cloud and cloud-free area at night. However, in case of solar radiation (during daytime, twilight, solar equinox around mid-night) this RGB is not usable.
Over cloud-free areas moisture boundaries might be seen.



SEVIRI Night Microphysics RGB, 23 January 2017, 01:25 UTC

## Background

The table shows which channels (or 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. (IR10.8-IR3.9) is the key channel difference for fog/low cloud detection. The (IR12.0-IR10.8) channel difference helps to separate thin from thick clouds. IR10.8 channel helps to separate thick clouds according their cloud top temperature. The colour of the cloud-free surface depends not only on the surface temperature, but on the atmospheric low-level moisture content as well.

| Colour | Channel [µm] | Physically relates to | Small contribution to the signal of | Large contribution to the signal of |
|---|---|---|---|---|
| Red | IR12.0 - IR10.8 | Cloud optical thickness | Thin clouds | Thick clouds |
| Green | IR10.8 – IR3.9 | Cloud phase | thin ice clouds | Thick fog/water clouds |
| Blue | IR10.8 | Cloud top temperature Land sea temperature | Cold clouds | Warm surface/ Warm clouds |

Notation: IR: infrared, number: central wavelength of the channel in micrometer.

## Benefits

- At low and mid-latitudes the Night Microphysics RGB provides the best colour contrast between water clouds and cloud free surface at night.
- It provides full cloud analysis at night.
- In some special conditions it provides nighttime snow detection - only if the temperature is very low and the snow is deep enough to cover completely the vegetation.
- It detects dust clouds.
- It detects fires, even if they are much smaller than the pixel size.

## Limitations

- It is not designed to be used during daytime. Daytime the HRV Fog, the Day Microphysics or the 24-hour Microphysics RGBs are recommended for fog or low cloud detection.
- The colours change in case solar radiation is present: all clouds appear magenta, except the fog/low clouds which may even ‘disappear’ during twilight. Around solar equinox the IR3.9 channel may contain some solar radiation around midnight spoiling this RGB at some areas.
- Fog and low clouds are not separable from each other based only on their colours.
- Fog/low cloud can be covered by higher-level clouds. If there are thin cirrus clouds above fog/low clouds, the Night Microphysics RGB might not detect the fog/low clouds.
- The thinner the low clouds/fog the more the colour looks like the colour of the ground (pinkish). The detection of very thin fog/low cloud is problematic.
- The IR3.9 brightness temperature values of the high, very cold clouds are often noisy resulting green dots in the reddish-brownish ice clouds. Therefore, this RGB is not recommended for night-time convection analysis. The IR10.8 single channel is more appropriate for this purpose.
- There is no snow detection at night – except some special cases (see benefits).

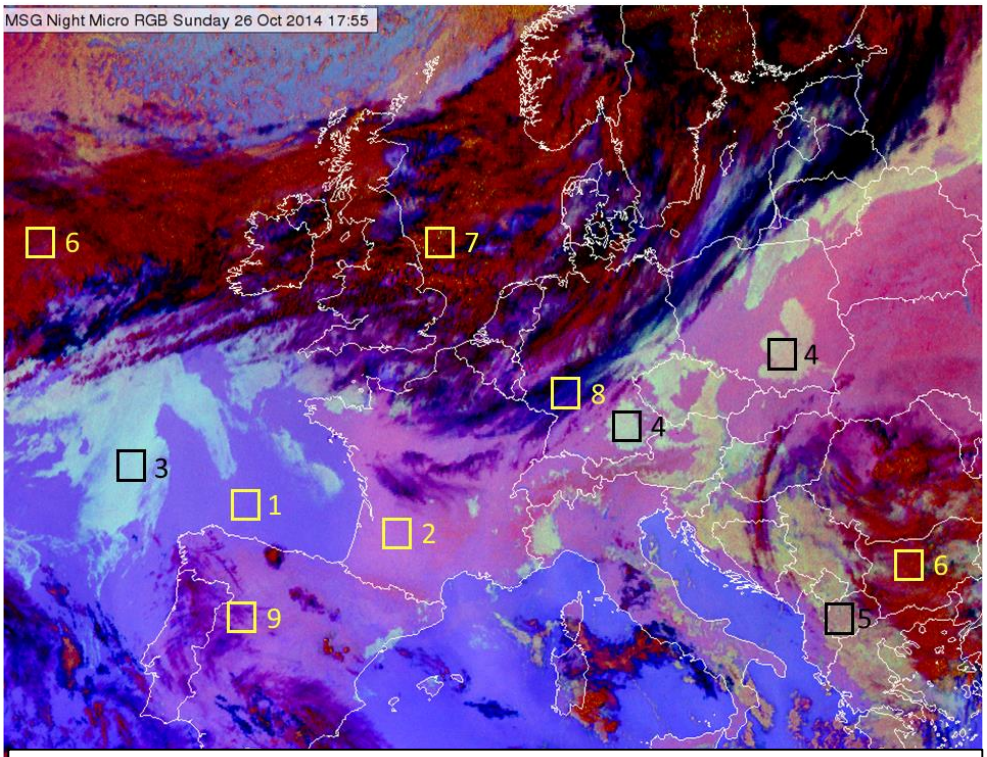
# SEVIRI Night Microphysics RGB Quick Guide

## Interpretation

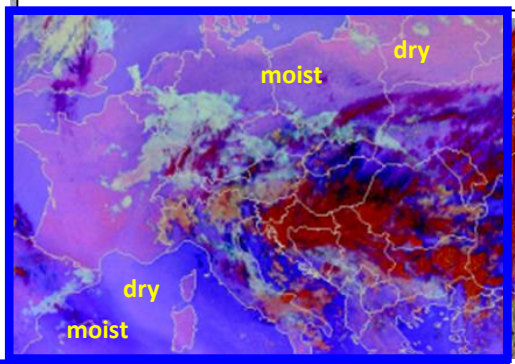
Colours may depend on viewing angles.

- **1** Cloud free sea and land (Shades of blue or pink depending on temperature and water vapour content, see the panel to the right)
- **2**
- **3** Warm, thick fog/low cloud, with small droplets (Shades of aqua)
- **4** Cold, thick fog/low cloud (Greenish in case of small droplets; pinkish grey in case of large droplets or thin cloud)
- **5** Thick mid-level cloud (Shades of tan)
- **6** Thick ice cloud (Reddish brown)
- **7** Very cold thick ice cloud (Reddish brown with green dots)
- **8** Thin cirrus (Shades of dark blue depending on the transparency)
- **9** Very thin cirrus (Shades of magenta depending on the transparency and the type of the underlying surface)
- **10** Clouds during daytime (Shades of magenta, red, blue depending on the temperature)

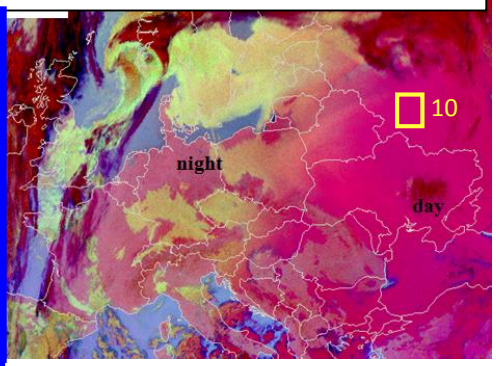
SEVIRI Night Microphysics RGB for 26 October 2014 17:55 UTC




3 September 2014, 20:40 UTC



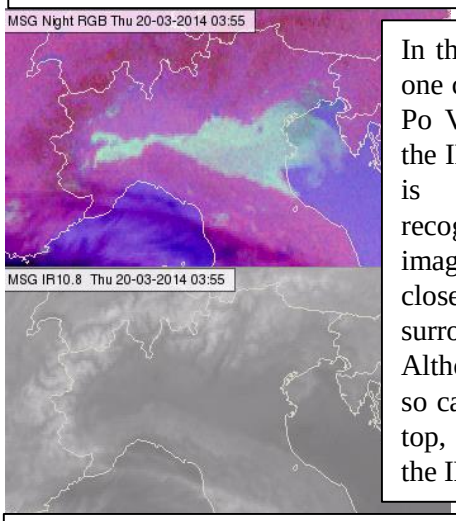

15 January 2006, 08:55 UTC




Over cloud-free areas moisture boundaries might be seen. The colour of the cloud-free area depends on the surface temperature and (low-level) moisture: moist areas have less red (look more bluish) and dry areas have more red (look more pinkish).

Useful links:
- MSG Interpretation Guide
- EUMeTrain Training Module
- RGB Colour Interpretation Guide
- NASA SPORT COMET module

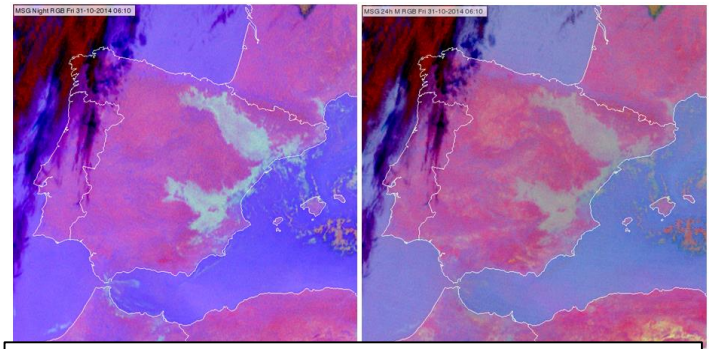
## Comparison to other products




Night Microphysics RGB (up) and IR10.8 image (bottom), 20 March 2014, 03:55 UTC

In the Night Microphysics RGB one can clearly see the fog in the Po Valley, much better then on the IR10.8 image. Fog/low cloud is usually not or hardly recognisable in the IR10.8 image, as its top temperature is close to the temperature of the surrounding cloud-free area. Although the example shows a so called "black fog" with warm top, it is far not eye-catching in the IR10.8 image.

At low and mid-latitudes the Night Microphysics RGB provides better colour contrast between fog/water clouds and the surface than the 24-hour Microphysics RGB does.



Night Microphysics (left) and 24-hour Microphysics (right) RGBs, 31 October 2014 06:10 UTC