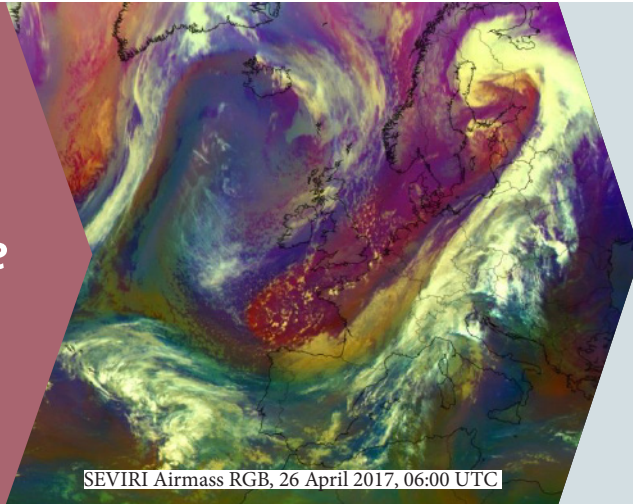## Quick Guide

SEVIRI Airmass RGB, 26 April 2017, 06:00 UTC

✶ Primary aim

Distinguishing **air masses** and high reaching **multi-layered clouds**; helps to analyse dynamic processes in the atmosphere.

✶ Time period and area of its main application:

This RGB can be used day and night through out the year, its colours do not change with seasons. Difficulties might arise at larger satellite viewing angles with increasing ozone absorption (limb cooling effect). Close to the limb, tropical air masses can not be analysed.

✶ Secondary aims

Detection of ongoing **cyclogenesis**, identification of areas with **subsidence**. Distinguishing high from mid-level clouds.

✶ Guidelines

The **Airmass RGB** is mainly used for distinguishing **polar** from **tropical** airmasses. On-going cyclogenesis, the position of jets and deformation zones can been seen at a glance, as well as frontal cloud systems and descending dry stratospheric air behind them.

Background

The **Airmass RGB** uses the two water vapour and the ozone absorption channels. The **WV6.2–WV7.3** difference (**red** colour beam) reflects the vertical humidity distribution. It distinguishes mid-level from high-level humidity and mid-level from high-level clouds. The **IR9.7–IR10.8** difference (**green** colour beam) is sensitive to the ozone content of the atmosphere. It distinguishes ozone rich polar air from ozone poor tropical air masses. All clouds are seen in this channel difference. **WV6.2** (**blue** colour beam) separates dry from moist air. Only the high clouds and upper level humidity are seen. The Airmass RGB does not provide microphysical information about clouds.

| Colour	Channel (mm)	Physically relates to	Smaller contribution to the signal of	Larger contribution to the signal of
Red	**WV6.2–WV7.3**	Vertical water vapour distribution / Mid-and high-level clouds	Mid-level humidity Mid-level clouds	**Dry upper levels** High-level clouds
Green	**IR9.7–IR10.8**	Height of tropopause Clouds at all levels	Polar air mass (Ozone rich)	***Tropical air mass (Ozone poor)***
Blue	**WV6.2**	Water vapourcontent in upper layer – High clouds	Dry upper levels	**Moist upper levels**

Notation : WV: water vapour, IR: infrared, channel number: central wavelength of the channel in micrometer [µm].

Benefits

- It indicates the position of jet streams and deformation zones.
- It indicates descending dry stratospheric air (e.g. behind cold fronts and in the centre of cyclones/upper level lows).
- The Air mass RGB distinguishes between cold and warm air masses (polar/tropical) through the assessment of the ozone content in channel IR9.7.
- It helps detect potential vorticity anomalies and related cyclogenesis.
- It discriminates mid- from high-level clouds.
- It evaluates the amount of upper tropospheric humidity (bright, strong green colour stands for more upper tropospheric humidity).
- Under certain conditions (e.g.over desert surfaces) the Air mass RGB is even better for volcanic SO_2 detection than the Ash RGB.
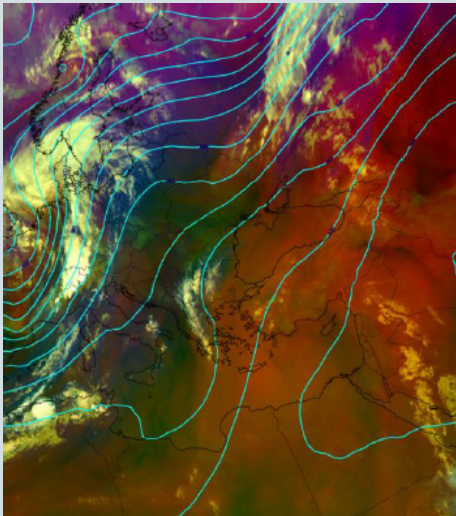
Limitations

- Close to the limb a tropical air mass appears bluish instead of greenish.
- If the surface temperature is very low in cloud-free areas, the contribution of the green beam is very large. This results into an olive green colour within a **polar** air mass instead of a bluish colour.
- While high- and mid-level clouds are easy to monitor, low-level clouds are hard to identify. Low-level clouds appear as patchy structure in the colour of the corresponding air mass.
- Reddish tones might also appear over areas without subsidence. This is caused by very hot and dry air (e.g. deserts).
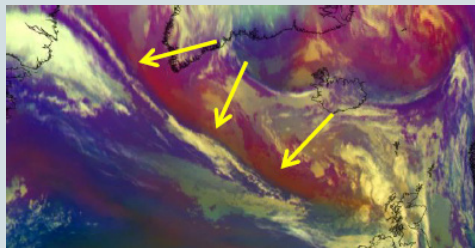- Very low clouds can not be distinguished satisfactorily.
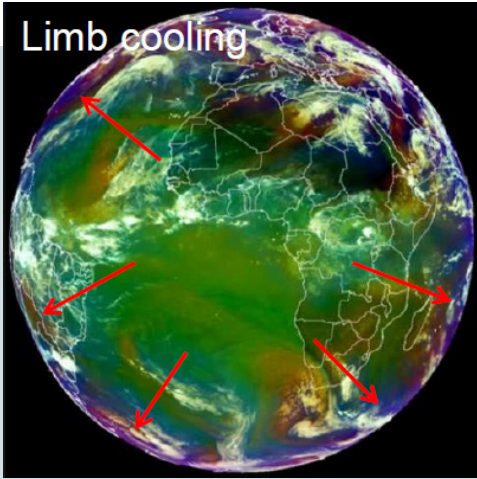
Limb cooling

Limb cooling effect: Ozone absorption increases with increasing satellite viewing angles. This results in high ozone absorption even in tropical areas and to a misleading blue colourfor the affected regions.
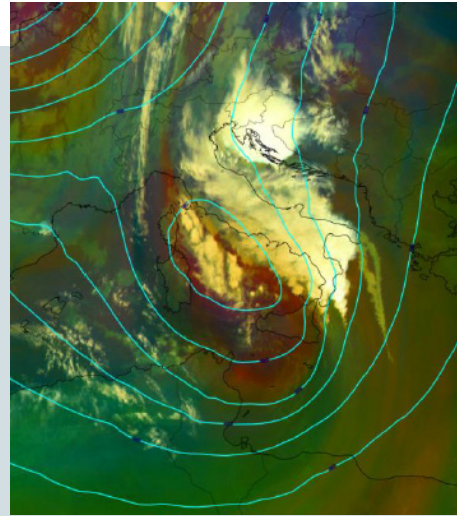

The Airmass RGB from 11 Sept. 2017, 06:00 UTC shows **reddish** colour tones over the Mediterranean Sea south west of Italy in the centreof an upper level trough (geopotential height at 500 hPa). This is an indication of ongoing **cyclogenesis** within a tropical air mass.

The above image from 7 Sept. 2017, 06:00 UTC shows the position of the **jet axis** along the transition from blue to red colours (yellow arrows).

Very **hot and dry air masses** also appear as **reddish** colour tones in the Airmass RGB as can be seen in the above image over south-eastern Europe on 8 August 2017 at 18:00 UTC. This is not an indication of ongoing cyclogenesis or subsidence.
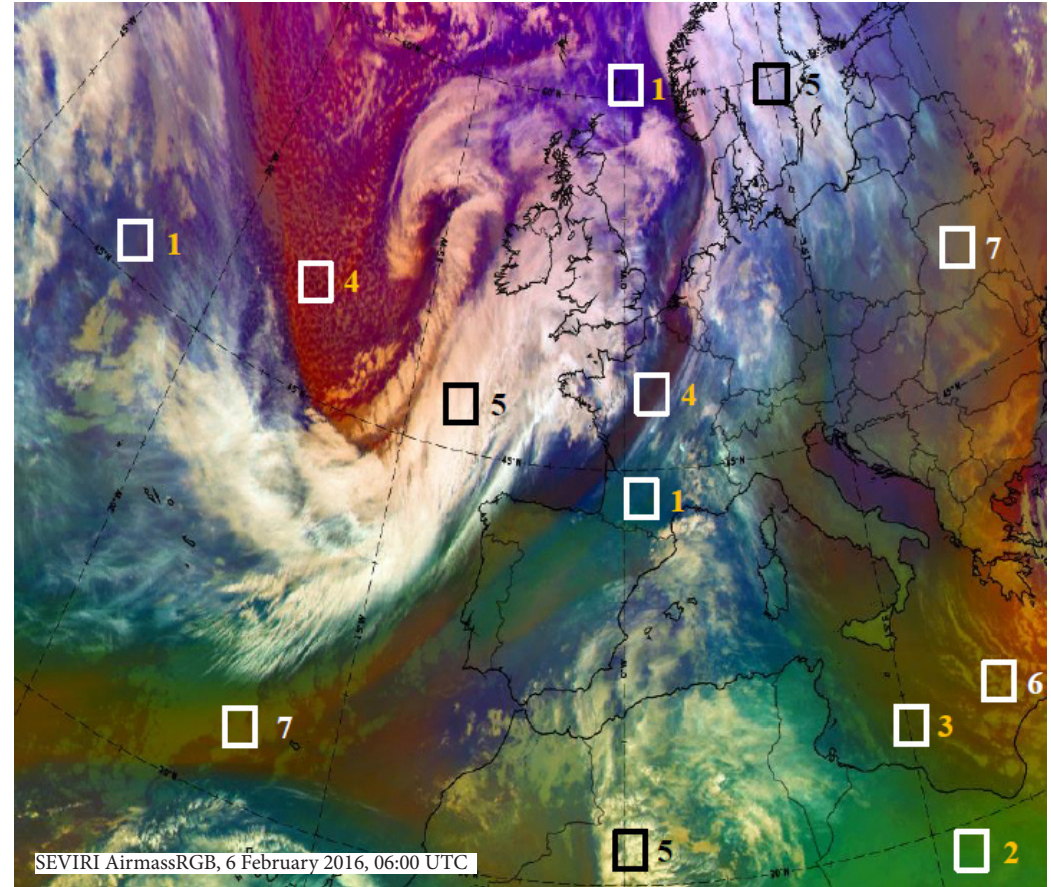
SEVIRI AirmassRGB, 6 February 2016, 06:00 UTC

Air masses:		Clouds:	
1	Cold, ozone richpolar air mass	5	High-level thick clouds
2	Warm, ozone poor tropical air masses (high upper tropospheric humidity)	6	Mid-level ice and water clouds
3	Warm air masses with low upper tropospheric humidity	7	Low-level clouds: no specific colour, just the structure is visible,appears bluish in polar and greenish in tropical air masses.
4	Dry air masses (indicating e.g. subsiding air, PV anomalies and the position of jet streams)		

EUMeTrain

More on RGBs on www.eumetrain.org