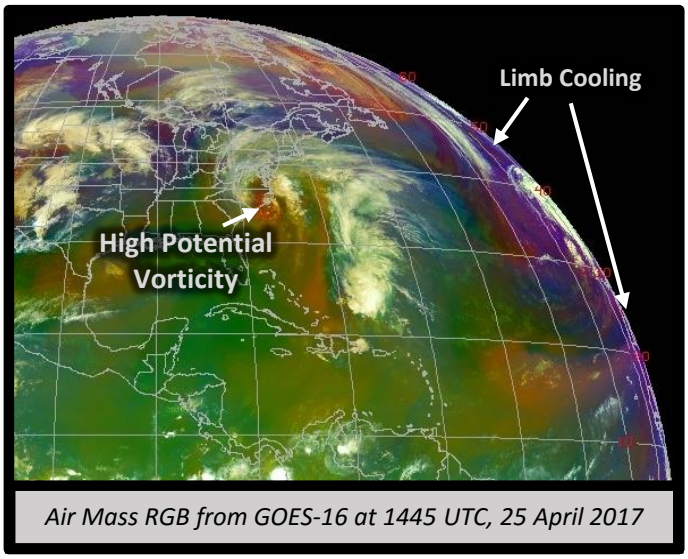
Air Mass RGB

Quick Guide

Why is the Air Mass RGB imagery Important?

The Air Mass RGB is used to diagnose the environment surrounding synoptic systems by enhancing temperature and moisture characteristics of air masses. Cyclogenesis can be inferred by the identification of warm, dry, ozone-rich descending stratospheric air associated with jet streams and potential vorticity (PV) anomalies. The RGB can be used to validate the location of PV anomalies in model data. Additionally, this RGB can distinguish between polar and tropical air masses, especially along upper-level frontal boundaries and identify high-, mid-, and low-level clouds.



Air Mass RGB from GOES-16 at 1445 UTC, 25 April 2017

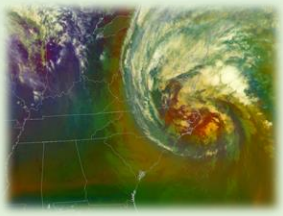
Air Mass RGB Recipe

**when cloud free*

Color	Band / Band Diff. (µm)	Min – Max Gamma	Physically Relates to…	*Small input to pixel indicates…	*Large input to pixel indicates…
Red	6.2 – 7.3	-26.2 to 0.6 C 1	Vertical water vapor difference	Moist upper levels	Dry upper levels
Green	9.6 – 10.3	-43.2 to 6.7 C 1	Tropopause height based on ozone	Low trop and high ozone	High trop and low ozone
Blue	6.2 (inverted)	-29.25 to -64.65 C 1	Water vapor ~200-500 mb	Dry upper levels	Moist upper levels

Impact on Operations

Primary Application



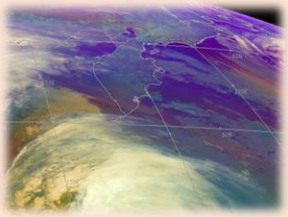
Inferring cyclogenesis: It is easy to see jet streams and stratospheric air intrusions with high PV, and the cyclonic activity created by these dynamics. Can also track cyclogenesis as shortwaves approach and low- to mid- level clouds form, evolve, and rotate.

Identifying air masses: Polar and tropical air masses are readily seen in the RGB imagery.

Secondary Applications:

Upper level moisture boundaries. Distinguishing between warm air masses with high and relatively low moisture, high clouds and mid-level clouds. Inferring turbulence by identifying stratospheric intrusion.

Limitations



Limb effects: The use of longer wavelength channels results in more atmospheric absorption at large viewing angles. As a result of the greater absorption, cooler brightness temperatures are measured. This limb cooling causes false blue and violet colors along the entire limb. Tropical air can appear blue rather than green at the limb.

Upper troposphere only: Conditions in the mid- to upper troposphere can be detected but surface conditions cannot be directly observed.

Intense Day-time heating: red/orange coloring is observed over dry desert regions during the summer; these dry upper levels don't indicate anomalous PV.

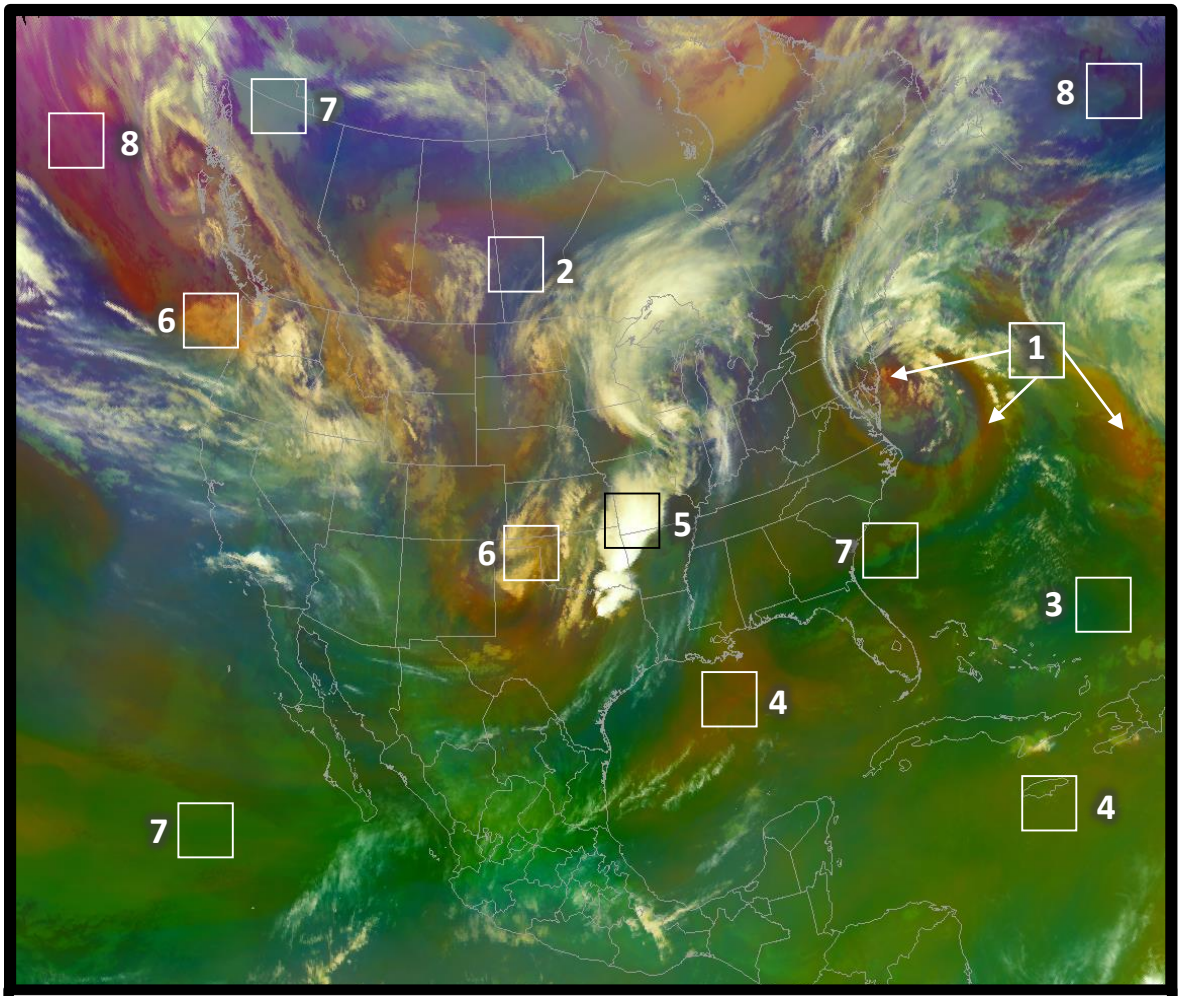
Contributor: Dr. Emily Berndt NASA SPoRT https://weather.msfc.nasa.gov/sport/

Air Mass RGB Quick Guide

RGB Interpretation

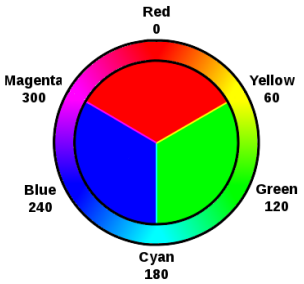
- **1** **Jet stream / PV / deformation zones / dry upper level** *(dark red/orange)*
- **2** **Cold air mass** *(dark blue/purple)*
- **3** **Warm air mass** *(green)*
- **4** **Warm air mass, less moisture** *(olive/dark orange)*
- **5** **High thick cloud** *(white)*
- **6** **Mid-level cloud** *(tan/salmon)*
- **7** **Low-level cloud** *(green, dark blue)*
- **8** **Limb effects** *(purple/blue)*

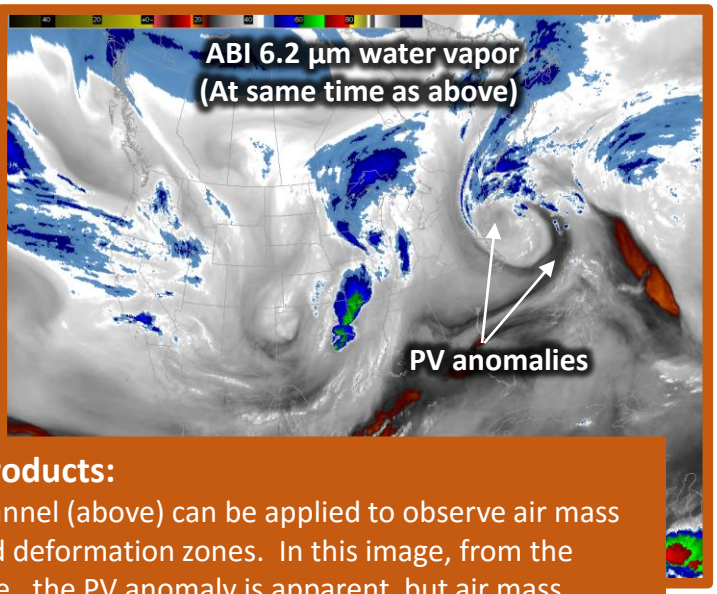
Note: colors may vary diurnally, seasonally, and latitudinally



Air Mass RGB from GOES-16 ABI at 1245 UTC, April 26 2017.

RGB Color Guide





Comparison to other products:
The 6.2 µm water vapor channel (above) can be applied to observe air mass interactions, jet streaks, and deformation zones. In this image, from the same time as the RGB above, the PV anomaly is apparent, but air mass temperature and ozone content are not.

Resources

UCAR/COMET
Multispectral Satellite Applications: RGB Products Explained

SPoRT
Air Mass RGB: Introduction (Module)

EUMETrain
RGB Interpretation Guide

Hyperlinks not available when viewing material in AIR Tool