

Interpretation Guide for METEOSAT-8 Satellite Products

METEOSAT SEVIRI (spinning enhanced visible and infrared imager)

Located at 41.5°E

1. Spectral channels available with SEVIRI

Channel No.	Spectral Band (μm)	Characteristics of Spectral Band (μm)			Main observational application
		λ_{cen}	λ_{min}	λ_{max}	
1	VIS0.6	0.635	0.56	0.71	Surface, clouds, wind fields
2	VIS0.8	0.81	0.74	0.88	Surface, clouds, wind fields
3	NIR1.6	1.64	1.50	1.78	Surface, cloud phase
4	IR3.9	3.90	3.48	4.36	Surface, clouds, wind fields
5	WV6.2	6.25	5.35	7.15	Water vapor, high level clouds, atmospheric instability
6	WV7.3	7.35	6.85	7.85	Water vapor, atmospheric instability
7	IR8.7	8.70	8.30	9.1	Surface, clouds, atmospheric instability
8	IR9.7	9.66	9.38	9.94	Ozone
9	IR10.8	10.80	9.80	11.80	Surface, clouds, wind fields, atmospheric instability
10	IR12.0	12.00	11.00	13.00	Surface, clouds, atmospheric instability
11	IR13.4	13.40	12.40	14.40	Cirrus cloud height, atmospheric instability
12	HRV	Broadband (about 0.4 – 1.1 μm)			Surface, clouds

Channels not available with INSAT-3D/3DR are coloured blue.

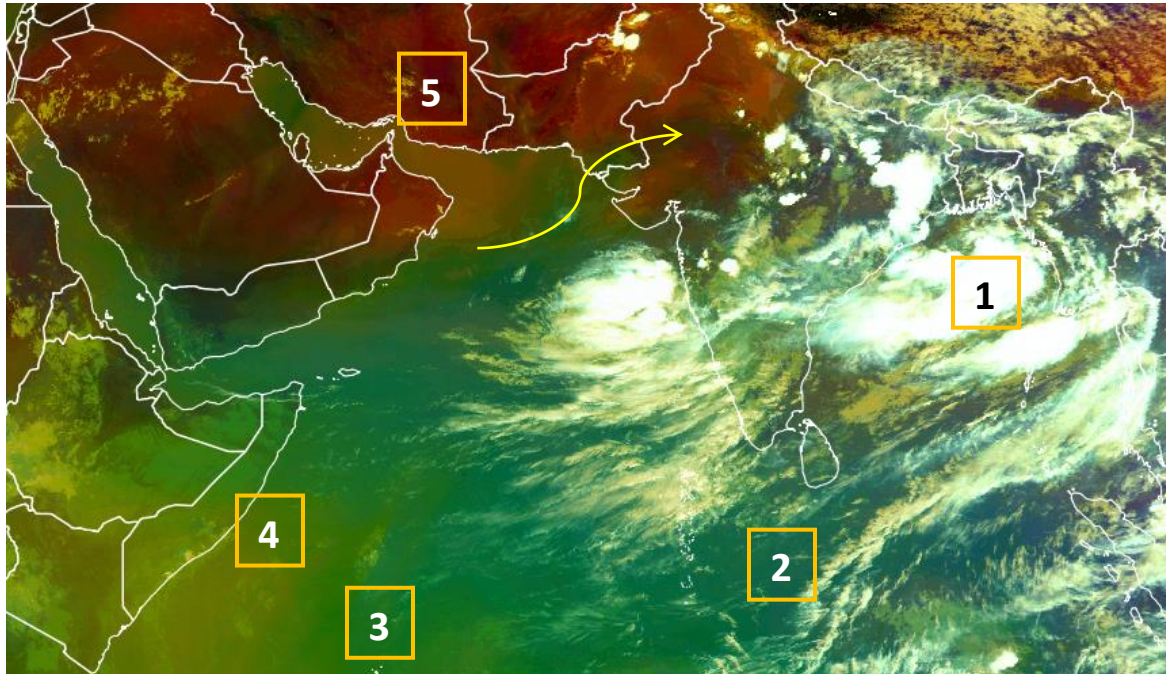
2. RGB products

These are formed by combining information from multiple channels in single image by making use of RGB colour mixing technique. Each channel and/or their combination (eg. Difference between 2 channels) is assigned one of the colour out of Red, Green and Blue. Hence each colour contains information from various channels and their mixing in different ratios gives rise to various shades representing different weather phenomena / clouds.

Recipes used in the formulation of various RGB products are given in the following table:

Product	Red	Green	Blue
Air-mass	WV6.2 -7.3	IR 9.7-10.8	WV 6.2
Convection	WV 6.2 – 7.3	IR 3.9 – 10.8	NIR 1.6 – VIS 0.6
Day Fog	IR12.0 - IR10.8 [-4 to +2]	IR10.8 - IR8.7 [0 to 6K]	IR10.8 [243 to 283]
Night Fog	IR 12.0 – 10.8 (-4K to +2k)	IR 10.8 – 3.9 (0 to +10K)	IR 10.8 (+243 to +293K)
Dust	IR 12.0 – 10.8	IR 10.8 - 8.7	IR 10.8
Day Microphysics	VIS0.8	IR3.9 solar reflectance	IR 10.8
True colour	NIR 1.6	VIS0.8	VIS 0.6

2.1 Airmass RGB

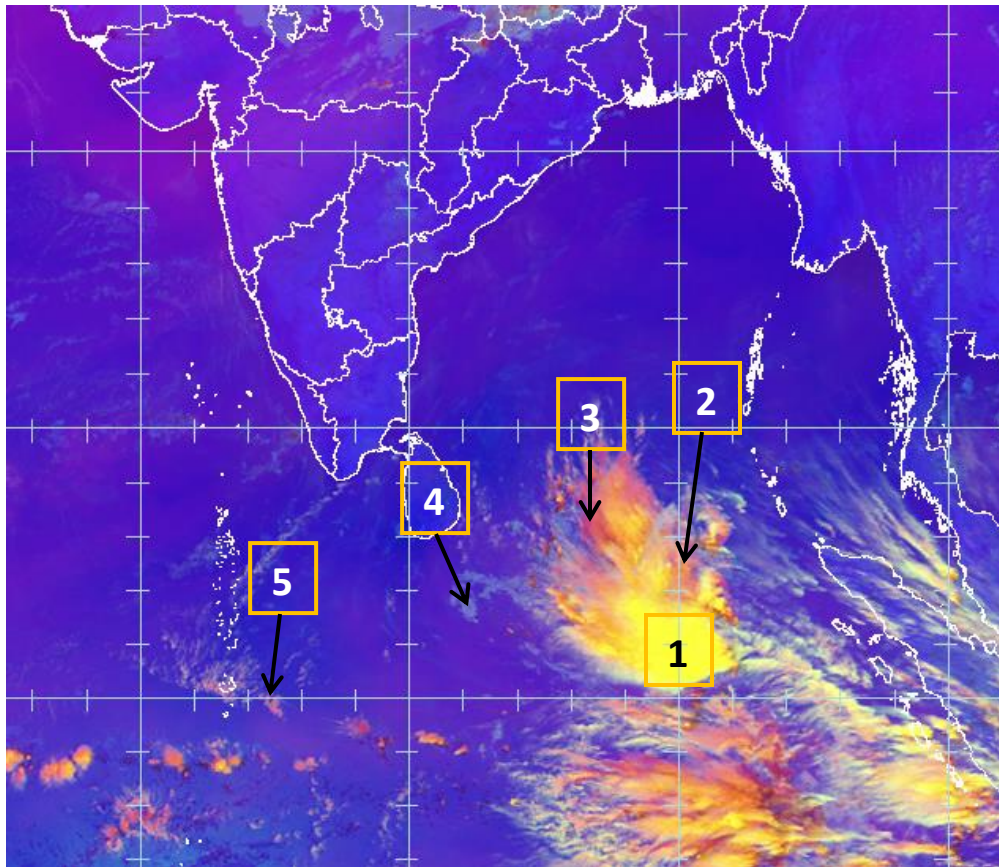


1. Dense convective clouds – Bright White
2. Cold airmass – bluish
3. Warm airmass - greenish
4. Warm airmass with lower moisture – Dull green
5. Dry air mass – reddish

Limitations:

1. Higher viewing angles cause more atmospheric absorption giving rise to false blue and violet colour. (Specific to METEOSAT 8 - the image portion east of the 95°E should be carefully analyzed, for rest of the image this effect is not observed owing to lower viewing angles)
2. This product is specific to mid to upper troposphere and does not reveal information about the surface conditions

2.2 Convection RGB

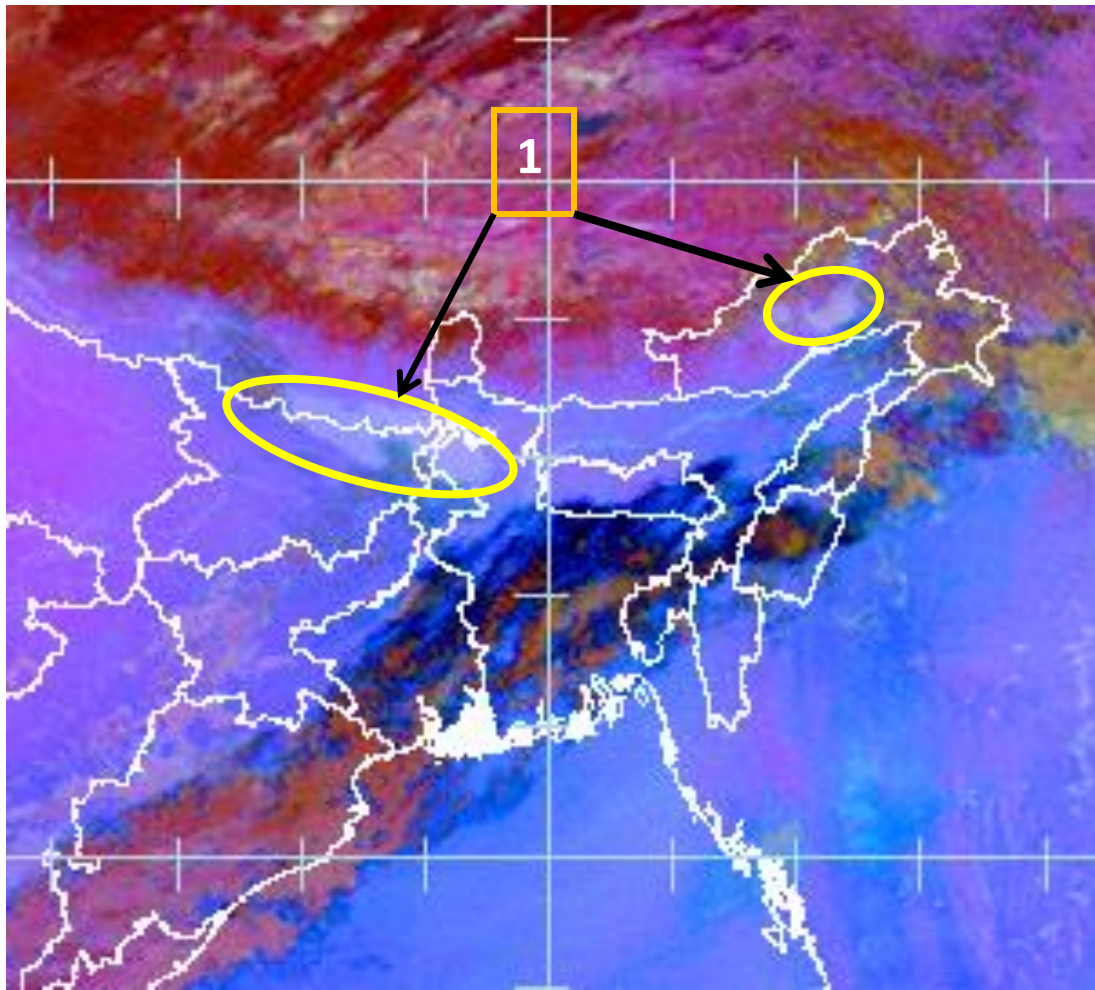


Note: Only to be used during day

Severe convective storms appear bright yellow. Brighter the yellow higher the convection

1. Strong convection, small ice particles – bright yellow (Strong updrafts bring small ice crystals to the top and small ice particles reflect more solar radiation than larger ones)
2. Moderate convection, large ice particles – orange
3. High clouds (cirriform) with Weak convection, large ice particles – red
4. Low-mid water clouds (Stratus, cumulus, alto-stratus/cumulus) – light blue
5. Thin cirrus with large ice particles

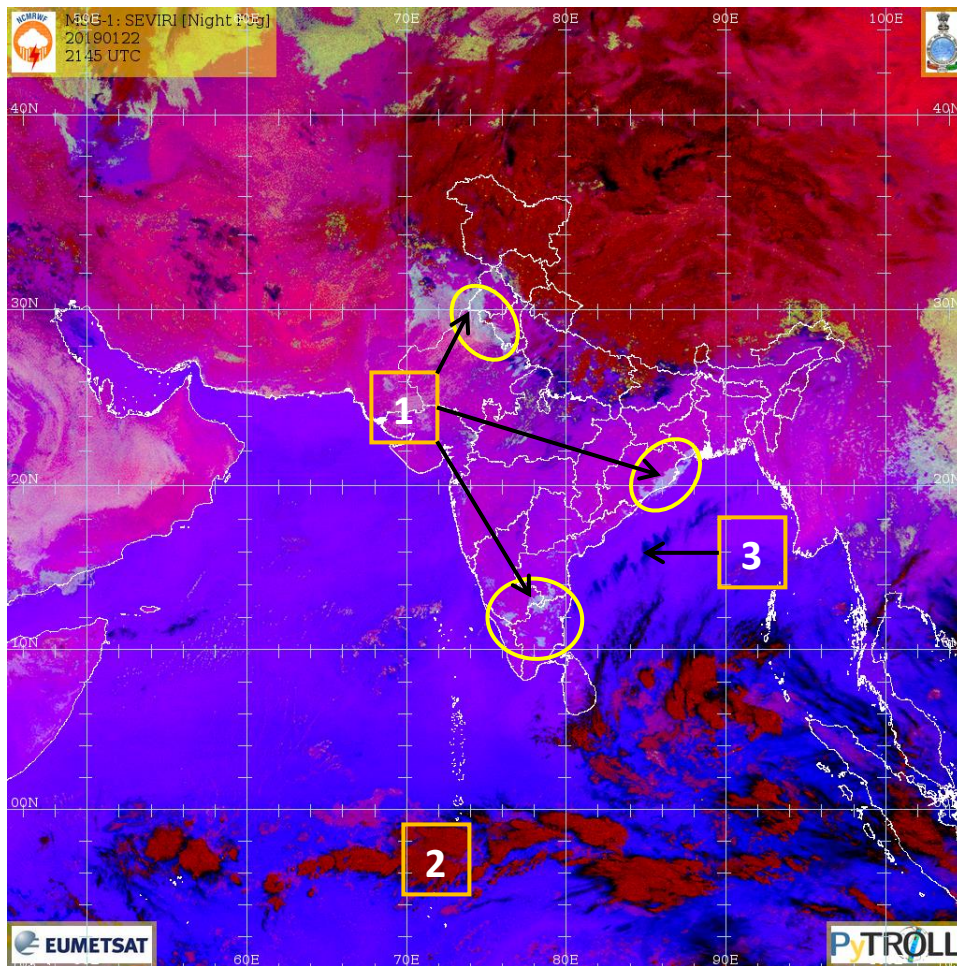
2.3 Day Fog



Note: Only to be used during day

1. Fog – Grey with sharp boundaries and no movement in animation

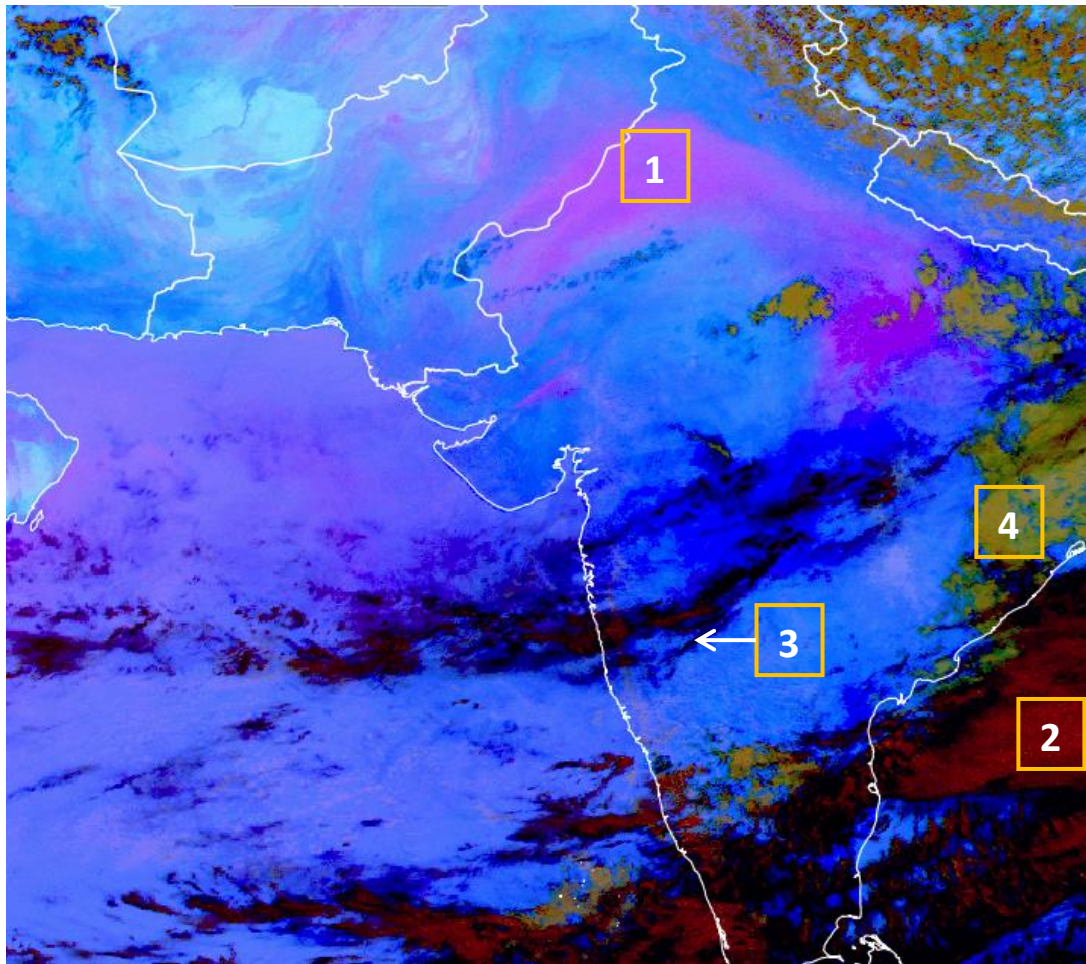
2.4 Night Fog RGB



Note: Only to be used during night

1. Fog – Grey with sharp boundaries and no movement in animation
2. Dense convective clouds –Red
3. Cirrus - black

2.5 Dust



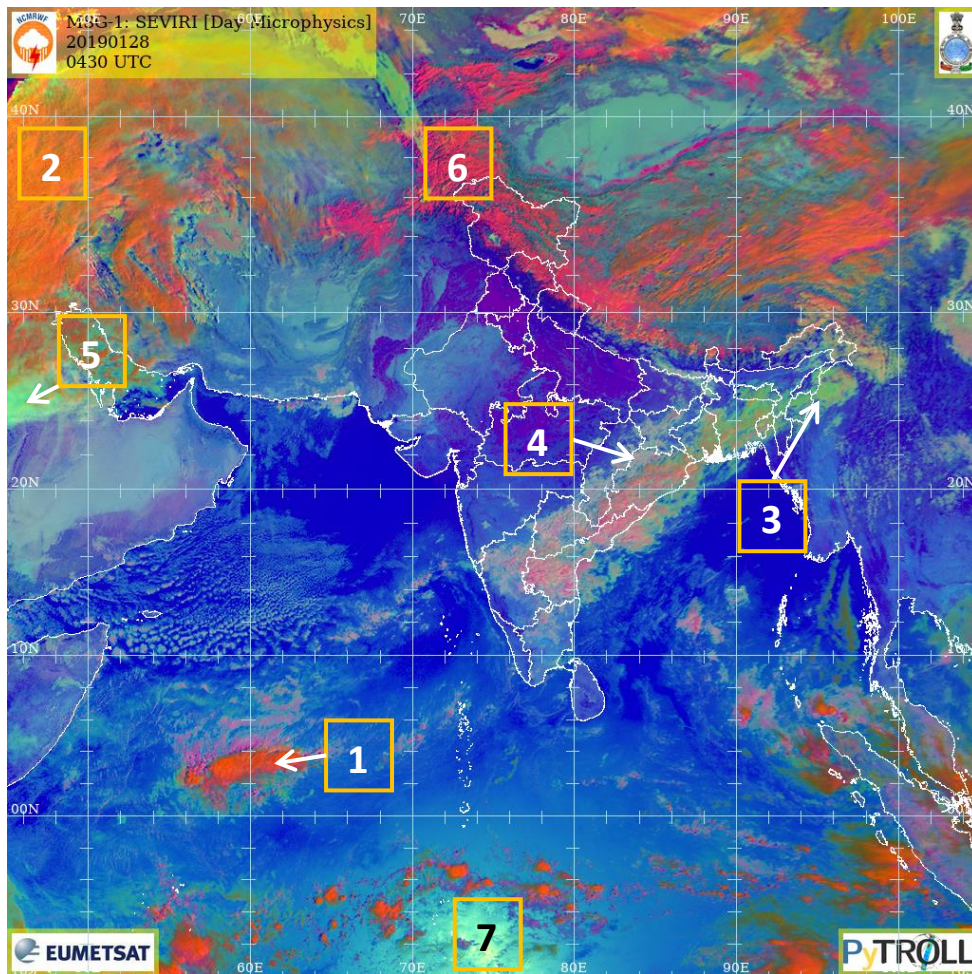
This product makes use of the difference response of Dust to the IR1 and IR2 channels. Dust is more sensitive to and absorbs more energy at 10.8 μm whereas cirrus clouds absorb more energy at 12.0.

1. Dust – Pink/ magenta during Day, Purple during Night,
2. Dense convective clouds – Red,
3. Thin cirrus clouds – Black
4. Thick mid-level (Alto / nimbo-stratus) clouds – Yellow,

Limitations

1. Height, visibility or concentration of dust cannot be objectively determined (Texture reveals information about the concentration)
2. Thin or low level dust over the sea is difficult to detect

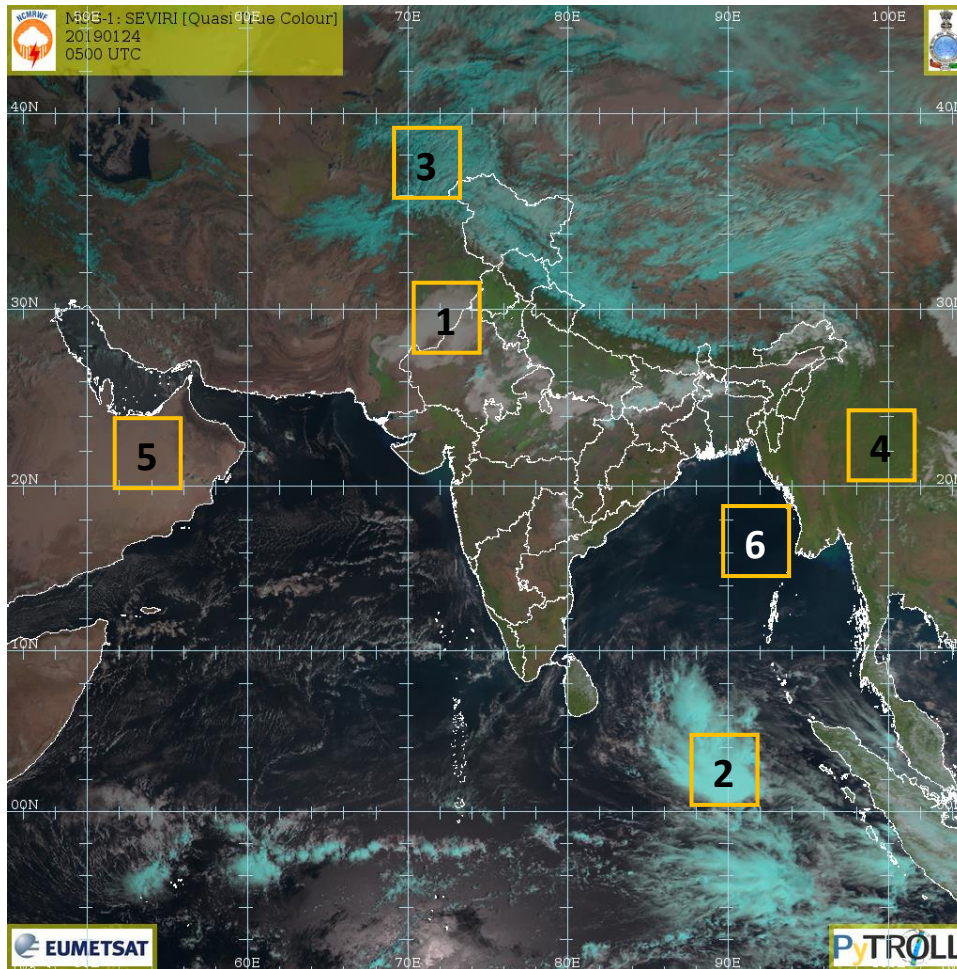
2.6 Day Microphysics RGB



Note: Only to be used during day

1. Dark orange – Dense convective clouds with small ice particles
2. Orange – mix layered clouds
3. Green – Low-mid level water clouds (cumulus/stratus/alto) with smaller water droplets
4. Low-mid level water clouds (cumulus/stratus/alto) with larger water droplets
5. Semi-transparent ice clouds
6. Snow – Magenta
7. Sun glint (sun-light is directly reflected towards the satellite causing bright area on image. It moves along the latitude with the movement of Sun as the day progresses.)

2.7 True Colour RGB (Also known as Natural Colour RGB)



Note: Only to be used during day

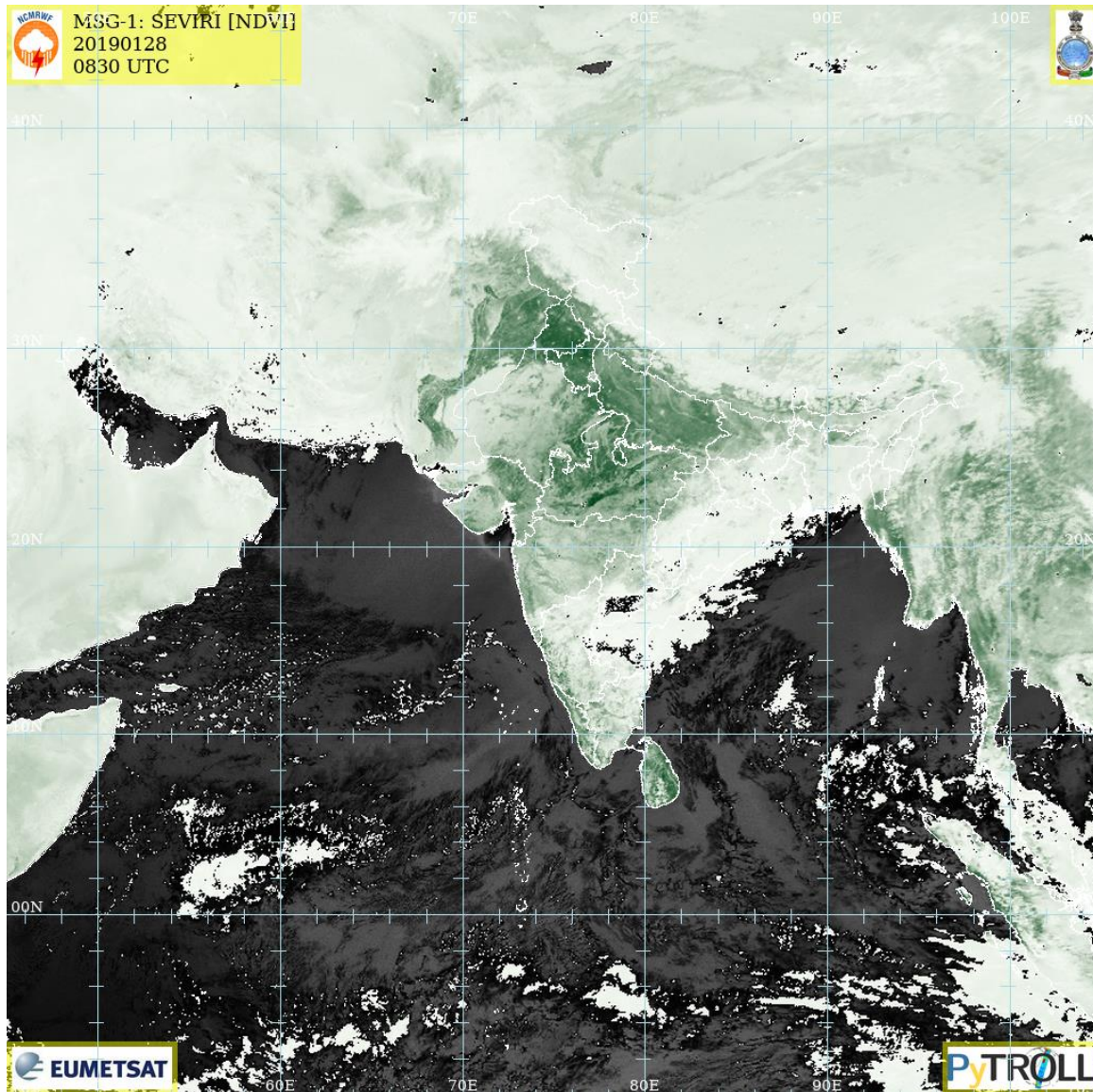
1. Water clouds / Fog : whitish
2. ice clouds : cyan
3. Snow cover : cyan (should be differentiated based on shape, type, local topography and movement as snow should appear stationary)
4. Vegetation: Green
5. Bare Soil : Brown
6. Ocean: Black

Limitations:

Thin cirrus clouds are not detected in this imagery

3 Other Products

3.1 Normalised Difference Vegetation Index (NDVI)



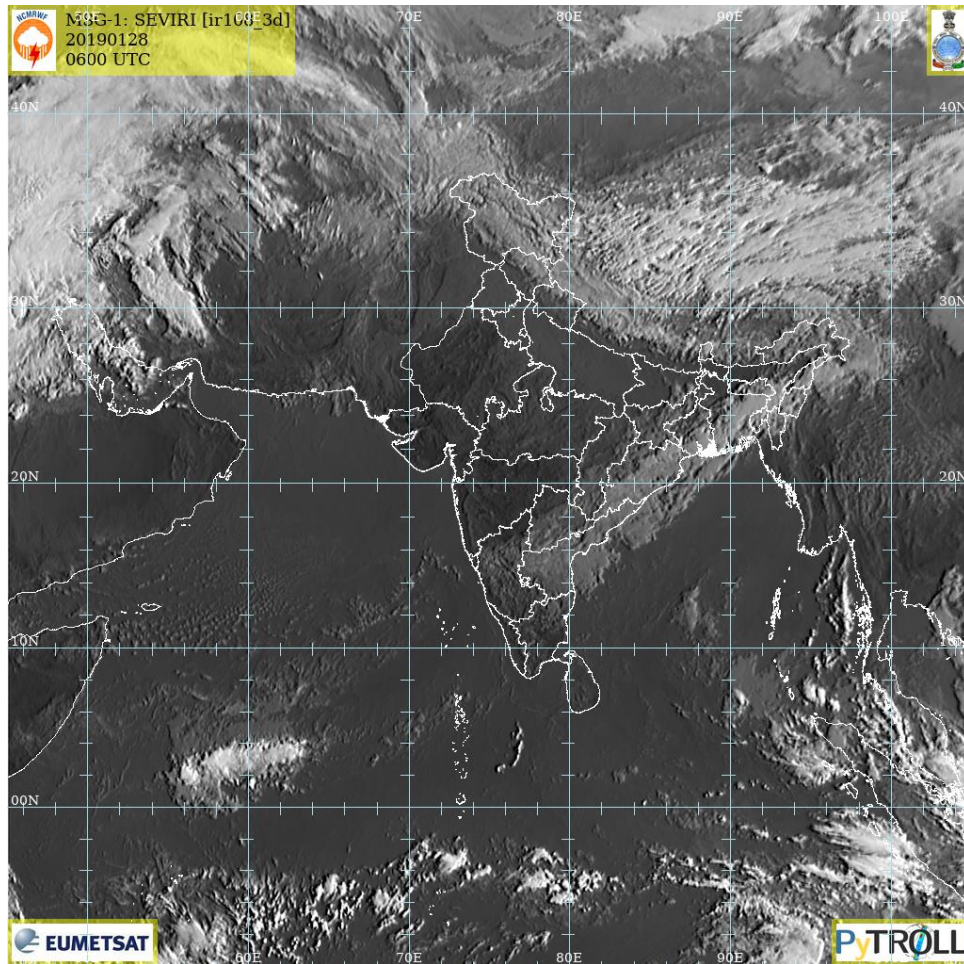
Note: Only to be used for cloud free region

$$\text{NDVI} = \frac{R(0.8\mu\text{m}) - R(0.6\mu\text{m})}{R(0.8\mu\text{m}) + R(0.6\mu\text{m})} \quad (\text{R is reflectance})$$

Values range in 0 to 1.

Darker the green shade thicker the vegetation.

3.2 IR-3D Product



Made by using convolution technique this image brings out the 3-Dimensional structure of clouds thereby providing information about its vertical structure. The elevation of clouds from the earth's surface helps in differentiating low-med-high clouds.

4 References & acknowledgement

http://eumetrain.org/rgb_quick_guides/index.html

5 Contact for queries and feedback

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