



# India Meteorological Department

## FDP STORM Bulletin No. 14 (20-03-2018)

### 1. CURRENT SYNOPTIC SITUATION:

#### NWFC INFERENCE (0300UTC of the Day):

- ◆ The Western Disturbance as a low pressure area over western parts of Afghanistan & neighbourhood now seen as an upper air cyclonic circulation over Afghanistan and adjoining Pakistan and extends upto 9.5 km above mean sea level.
- ◆ The induced cyclonic circulation over south Pakistan & neighbourhood extending upto 1.5 km above mean sea level has become less marked.
- ◆ A cyclonic circulation at 0.9 km above mean sea level lies over southeast Rajasthan & adjoining West Madhya Pradesh.
- ◆ A cyclonic circulation lies over Vidarbha & neighbourhood and extends upto 1.5 km above mean sea level.
- ◆ A trough extending upto 0.9 km above mean sea level runs from north Odisha to North Interior Karnataka across the cyclonic circulation over Vidarbha & neighbourhood.
- ◆ The cyclonic circulation extending upto 0.9 km above mean sea level over southeast Arabian Sea off Kerala Coast persists.
- ◆ A cyclonic circulation extending upto 0.9 km above mean sea level lies over Comorin area and neighbourhood.
- ◆ The feeble trough of low at mean sea level over Equatorial Indian Ocean and adjoining southeast Bay of Bengal now lies over Equatorial Indian Ocean and adjoining central parts of south Bay of Bengal.
- ◆ The cyclonic circulation extending upto 1.5 km above mean sea level over north Madhya Maharashtra & neighbourhood has become less marked.
- ◆ The trough extending upto 0.9 km above mean sea level from the above cyclonic circulation to central parts of Rajasthan has also become less marked.
- ◆ The trough in the westerlies extending upto 0.9 km above mean sea level from East Bangladesh to interior Odisha with an embedded cyclonic circulation over north Odisha & neighbourhood has become less marked.
- ◆ The trough in low level easterlies extending upto 0.9 km above mean sea level from the above cyclonic circulation to north Interior Karnataka across Kerala & south Interior Karnataka has become less marked.

**SATELLITE OBSERVATIONS during past 24hrs and current observation:**

**Current Observation (based on 0300UTC imagery of INSAT 3D):**

**Western Disturbance (WD):**

Broken multi-layered clouds observed over Afghanistan, North Pakistan, Jammu & Kashmir, Punjab and over the area between lat 37.0N to 45.0N and 70.0E to 99.0E in association with WD over the area.

**Clouds description within India:**

Broken low/medium clouds were seen over Northeast Rajasthan, Madhya Pradesh and Vidarbha,. Scattered low/medium clouds were seen over North Haryana, South-central Uttar Pradesh, Sikkim, Arunachal Pradesh, Telangana, Rayalaseema, and North Coastal Andhra Pradesh.

**Arabian Sea:**

No significant clouds over the region.

**Bay of Bengal & Andaman Sea:**

Scattered low/medium clouds with embedded isolated weak to moderate convection seen over Southern parts of Andaman Sea.

**Past Weather:**

**Convection (during last 24 hrs):**

Weak to moderate convection was observed over J&K Himachal Pradesh, Punjab and Madhya Pradesh.

**OLR:**

Upto 230  $\text{wm}^{-2}$  was observed over J&K Himachal Pradesh, Punjab & NC AP (.)

**Convective Activity:**

Cell No	Date/Time UTC	Area	CTT	Remarks (if any)
1	19/0900	South Interior Karnataka adjoining North Kerala	75	--
	1000		73	--
	1100		77	--
	1200		76	--
	1300		65	--
	1400		51	--
	1500		54	--

**Synoptic Features:**

**Westerly Trough:** Nil

**Dynamic Features:**

Negative shear tendency is observed over Bihar and N/Hood and Positive shear tendency over rest parts of India.

Medium to high wind shear is observed over North & Central India and low wind shear over South Peninsula region.

**Precipitation:**

**IMR:**

Rainfall upto 01-20 mm observed over Karnataka adjoining North-West Tamilnadu and J & K, North-East Himachal Pradesh.

**HEM:**

Rainfall upto 14 mm observed over Karnataka.

**RADAR and RAPID RGB Observation:**

Isolated light echoes are seen on DWR Bhopal domain at around 1200 IST.

No significant convection is seen in RAPID RGB Satellite imagery at 1100IST.

**Environmental condition (dust etc) and its forecast based on 00UTC of date:**

Higher Dust concentration was observed over Arab countries and northern part of Africa. Dust concentration is expected to decrease over north-western part of India for next five days. PM10 concentration is expected to increase over IGP in next five days.

Particulate matter concentration is expected to remain in moderate category for next 2 days in Delhi.

<b>Delhi – SAFAR analysis &amp; Forecast</b>	20.03.2018	21.03.2018
PM10 (micro-g/m <sup>3</sup> )	157	172
PM2.5 (micro-g/m <sup>3</sup> )	73	80

## 2. NWP MODEL GUIDANCE:

### IMD GFS (T1534) based on 00UTC the day:-

#### 1. Synoptic Systems:

The analysis based on 00 UTC shows an induced cyclonic circulation in lower troposphere over central Pakistan and adjoining west Rajasthan which moves eastward and lies over east Pakistan and adjoining west Rajasthan on day1 and over Punjab and adjoining areas on day2 and becomes less marked thereafter. Another cyclonic circulation over west Madhya Pradesh and adjoining areas moves eastward and lies over central parts of Madhya Pradesh on day1 and becomes less marked thereafter. A north-south trough runs from this cyclonic circulation up to extreme south peninsula extending over central and peninsular India on day1. In the analysis another trough is running from east Bangladesh to Orissa. In the forecast, north south trough is seen over Bangladesh during next three days.

#### 2. Location of Jet and Jet Core (>60kt) at 500hPa:

Although the presence of strong westerlies is found but no jet core over the Indian region for the next 3 days.

#### 3. Low Level Vorticity {850hPa Positive Vorticity (>12 x 10<sup>-1</sup>/s)}:

Mostly along foothills of Himalayas and along the north-south trough over the central parts of the country to Karnataka during next 3 days.

#### 4. Spatial distribution of T-storm Initiation Index, Lifted Index, Total Total Index, CAPE, CIN and Sweat Index [High potential for thunderstorm]:

**T-Storm Initiation Index (> 3):** Higher than a value 3 over parts of Gujarat coastal areas of Gangetic West Bengal, Orissa, Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, coastal Maharashtra, Konkan & Goa, along east coast and west coast on all 3 days. Over parts of Punjab, Haryana and adjoining area on day 2; maximum value of index is seen along the east coast GWB and adjoining coastal Orissa, Andhra Pradesh from day 2 onwards.

**Lifted Index (< -2):** The threshold value of the is below -2 over southern part of west coast, along the east coast, and coastal Orissa, Andhra Pradesh, coastal Karnataka, Kerala and Tamil Nadu on all 3 days; over parts of Gujarat, Punjab, Haryana, Delhi, Uttar Pradesh, and east Madhya Pradesh on day 2; maximum negative value of the index can be seen on day 2 and 3 over the places along the east coast and southern part of west coast GWB, Orissa, Kerala Andhra Pradesh and Tamil Nadu.

**Total Total Index (> 50) :** Above threshold value over J&K, Uttarakhand, Punjab, Haryana, Himachal Pradesh, Uttarakhand, places along foothills of Himalaya Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, GWB, Orissa Tamil Nadu and Andhra Pradesh on day 1 and 2. On day 3 over parts of Uttar Pradesh and east Madhya Pradesh. Maximum value is seen over parts of Himachal Pradesh, Uttarakhand, foot hills of Himalaya and coastal Tamil Nadu on day 1 and 2.

**Sweat Index (> 300):** Parts of NE states, Coastal areas of GWB, Peninsular India, Konkan & Goa, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand, Rajasthan, Orissa, Madhya Maharashtra, Marathawada, adjoining Vidarbha, J&K, Punjab, Haryana, Delhi, coastal areas of south and east coast during all 3 days. Maximum value of the index can be seen over GWB coastal Orissa and adjoining area on day 3.

**CAPE (> 1000):** Mostly along coastal areas of southern peninsular India along west coast and over east coast and coastal areas of GWB and Orissa during all 3 days. Maximum value can be seen on day 3 over coastal Orissa, GWB and coastal Tamil Nadu.

**CIN (50-150):** Mostly over parts of Gujarat, along east coast along west coast from Saurashtra & Kutch to coastal Karnataka Konkan and Goa, coastal Orissa, Telangana, Andhra Pradesh and GWB during next 3 days.. Over parts of west Rajasthan, Madhya Pradesh, Chhattisgarh, Punjab, Haryana, Delhi, Uttar Pradesh and NE India on day 2. Maximum value is seen over parts of Haryana, Delhi and adjoining west Uttar Pradesh on day 2..

### **5. Rainfall Activity:**

10- 40 mm rainfall: On day 1 over parts of J&K ; on day 2 over J&K, Punjab, Himachal Pradesh, Uttarakhand, parts of Haryana, West Uttar Pradesh, Karnataka and Kerala ; on day 3 over some parts of Uttarakhand, Karnataka, Kerala, Tamil Nadu and some parts of Arunachal Pradesh.

Up to 10 mm rainfall: Over parts of J&K, Uttarakhand, West Rajasthan, Punjab, Haryana, Delhi, Uttar Pradesh, Karnataka and Kerala, Tamil Nadu, Arunachal Pradesh, Assam, Tripura and adjoining area during all 3 days. Madhya Pradesh, Chhattisgarh, Vidarbha, Bihar, Jharkhand, Orissa, Andhra Pradesh, GWB and adjoining area on day 2 and 3. Over parts of east and west Madhya Pradesh and adjoining Vidarbha on day 1.

### **IMD WRF (9km based on 00UTC of the day):**

#### **1. Model Reflectivity (Max.dBz):**

On day 1, over some parts of J & K; On day 2 and 3 over parts of Punjab and Haryana, J & K, Himachal Pradesh, Uttarakhand, west and east Uttar Pradesh near the foothills of Himalayas.

#### **2. Spatial distribution of Total Total Index, K-Index, CAPE and CIN [High potential for thunderstorm]:**

**Total Total Index (> 50):** Above threshold value is observed over most parts of the country except south peninsula, along east and west coast and north-eastern states Bihar, Jharkhand, Gujarat and south west Rajasthan on day 1 and threshold value is observed over most parts of the country except south peninsula, along east and west coast and north-eastern states on day 2 and 3. The maximum values are found over Bihar, Jharkhand, Chhattisgarh, adjoining Madhya Pradesh and east Uttar Pradesh on day 2 and 3.

**K-Index (> 35):** Less than threshold value is observed over the country during the next 3 days except over parts Karnataka, Marathawada, Madhya Maharashtra and Vidarbha southern Peninsular India, Orissa and adjoining area and NE states on day 2 and 3.

**CAPE (> 1000):** Greater than threshold value over the southern part of west coast, east coast, coastal Orissa, GWB and parts of Tamil Nadu, Kerala and coastal Karnataka, Konkan and Goa and during the next 3 days. Some parts of Madhya Maharashtra and adjoining area on day 1. Over Punjab, adjoining southwest Rajasthan, Haryana, Delhi, Uttar Pradesh on day 2 and 3; Maximum value greater than 3000 is seen over the places along the east coast and southern part of west coast during all 3 days.

**CIN (50-150):** some places over Punjab and adjoining Rajasthan, Madhya Pradesh and adjoining Maharashtra region, Vidarbha, and Marathawada, coastal areas along east coast and west coast Konkan and Goa, southern parts of peninsular India, parts of Arunachal Pradesh and GWB during all 3 days; over parts of J & K, Himachal Pradesh, Uttarakhand, Punjab, north west Rajasthan, Haryana, Delhi, East and west

Uttar Pradesh, east Madhya Pradesh, Vidarbha, Chhattisgarh, Gujarat, Saurashtra region and southern part of east and west coast, Orissa, southern part of peninsular India and GWB and NE states from day 2 onwards..

**3. Rainfall and Thunderstorm Activity:**

70 - 130 mm rainfall: Over some parts of Uttarakhand on day 2.

40- 70 mm rainfall: Over parts of Himachal Pradesh and Uttarakhand on day 2 and 3.

10- 40 mm rainfall: Over parts of Punjab, Haryana, J&K, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Kerala and adjoining interior and Karnataka on day 2 and day3. Coastal areas of Kerala and Karnataka on day 1.

Up to10 mm rainfall: Over parts of J&K, Punjab, Haryana, Delhi, Uttar Pradesh, south west Rajasthan, parts of east Madhya Pradesh, NE states, coastal Kerala, Karnataka and Tamil Nadu on day 2 and 3. On day 1 over J&K, Punjab, Haryana, and adjoining Uttar Pradesh some parts of Madhya Pradesh, NE states, coastal Kerala and Karnataka.

**3. IOP ADVISORY FOR 24 and 48Hrs:**

**Summary and Conclusions:**

**Day-1 & Day-2:**

Synoptic analysis indicates that there is a cyclonic circulation at 0.9 km above mean sea level over Southeast Rajasthan & adjoining West Madhya Pradesh. However, model analysis (ECMWF and GFS) indicates a more north westward location of the cyclonic circulation over central Pakistan and adjoining Rajasthan. Models indicate that there is some moisture flow into the circulation from the anticyclone over the Arabian Sea. This is likely to cease as the circulation moves northwards during the course of the day. Hence, no severe weather is expected over the country during the next 24 hours. On day 2, an anticyclone is placed over Central India. Moist winds inland from the Arabian Sea, along the periphery of the anticyclone and into the cyclonic circulation is likely to result in thunderstorm activity over Punjab, and thunderstorms accompanied by hailstorms over Himachal Pradesh and Uttarakhand on day 2. Thunderstorms or dust storms are also expected to occur over Haryana, Chandigarh, Delhi, North Rajasthan and Uttar Pradesh on day 2.

**24 hour Advisory for IOP:**

**Rainfall:**

Nil

**Thunderstorm with associated phenomenon:**

Nil

**48 hour Advisory for IOP:**

**Rainfall:**

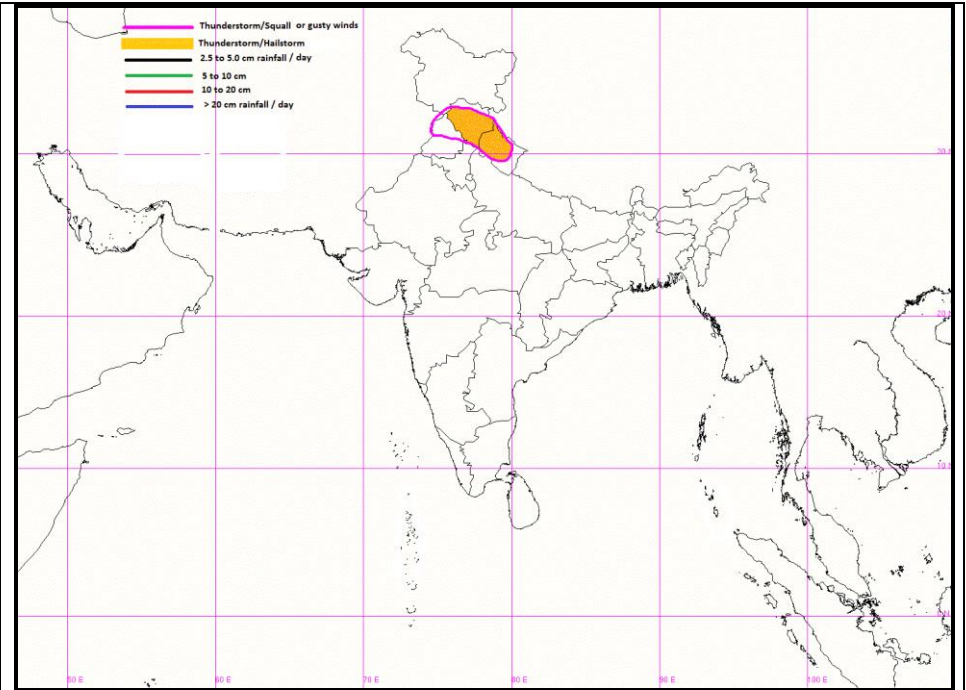
Nil

**Thunderstorm with associated phenomenon:**

Himachal Pradesh, Uttarakhand, Punjab

**Graphical Presentation of Potential Areas for Severe Weather:**

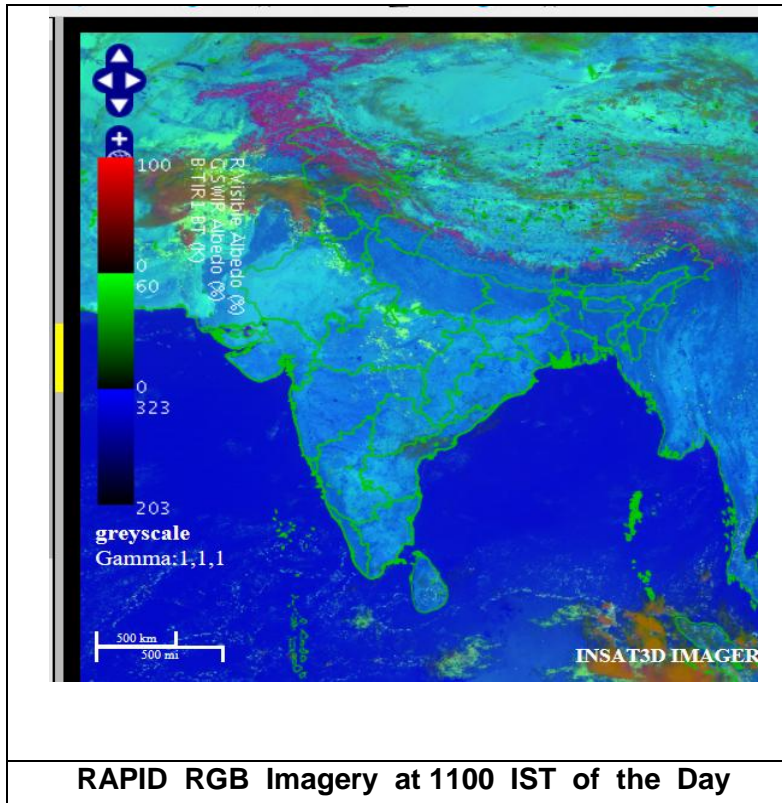
**NO WARNING FOR SEVERE WEATHER**



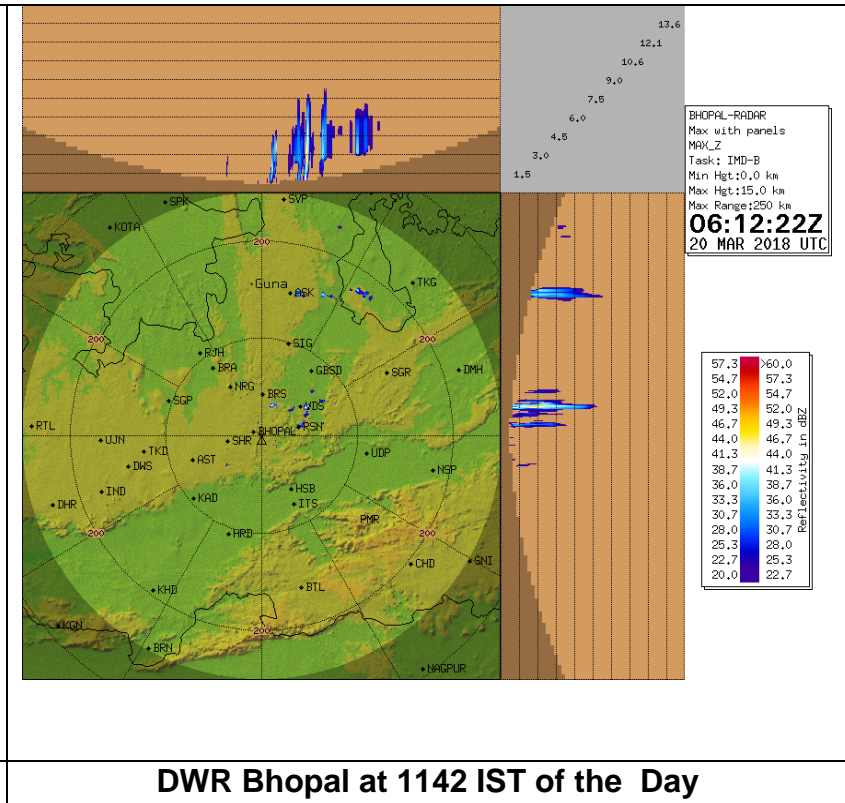
**IOP Advisory for 24 hours**

**IOP Advisory for 48 hours**



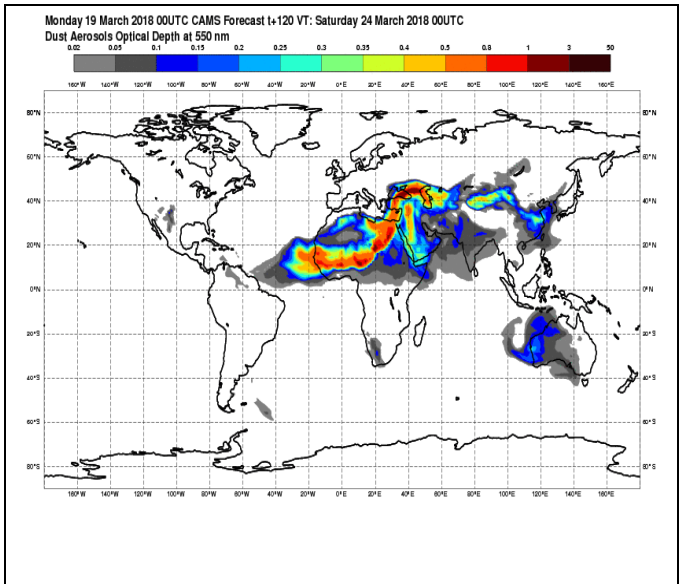


RAPID RGB Imagery at 1100 IST of the Day

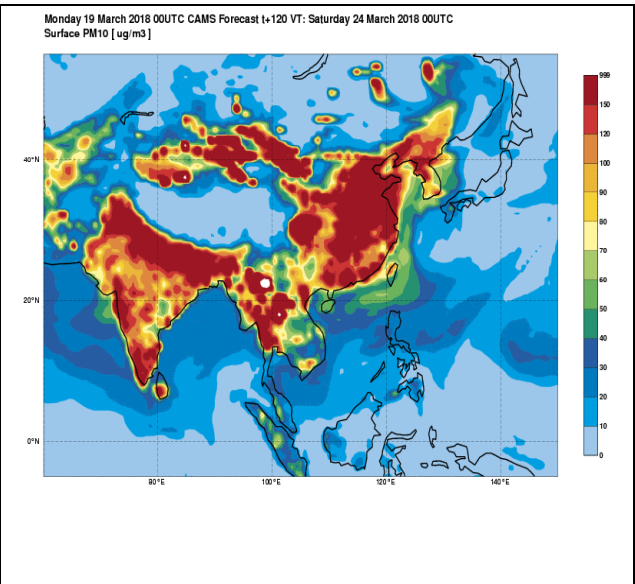


DWR Bhopal at 1142 IST of the Day

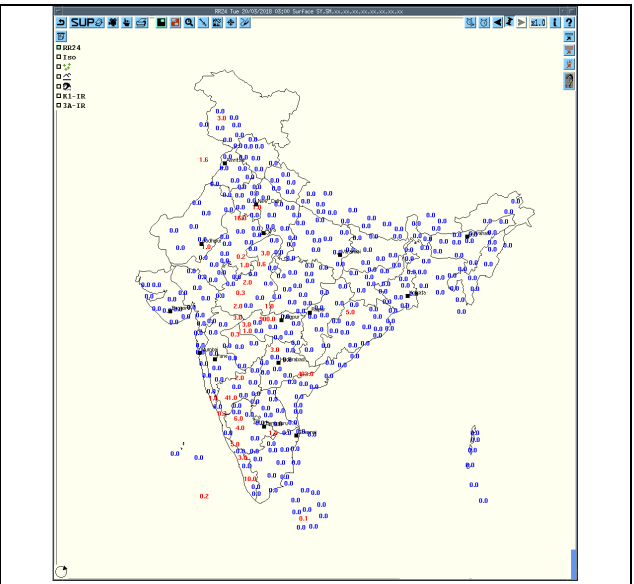




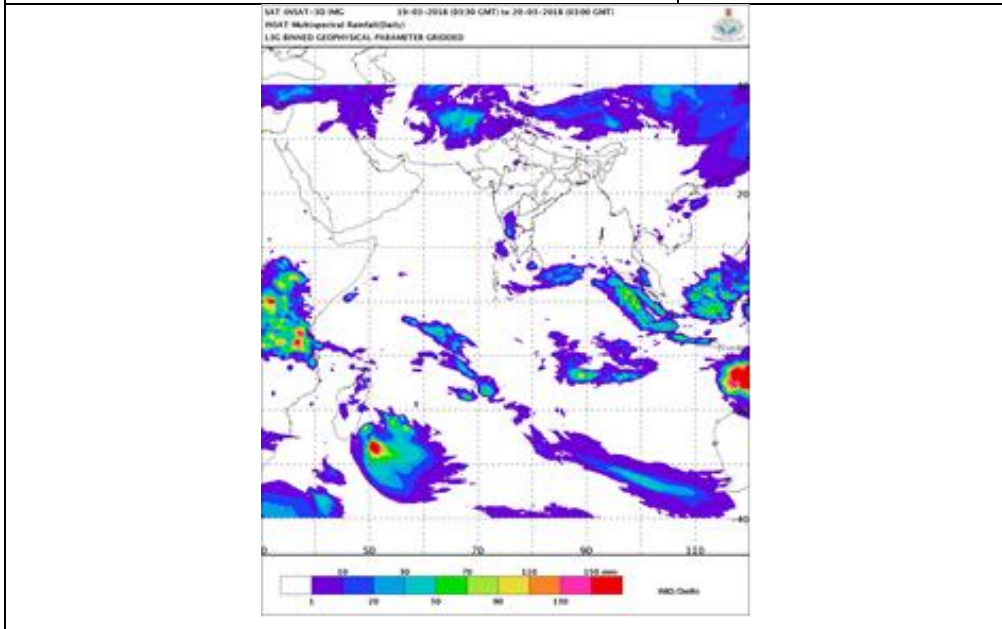
Forecast Dust Concentration



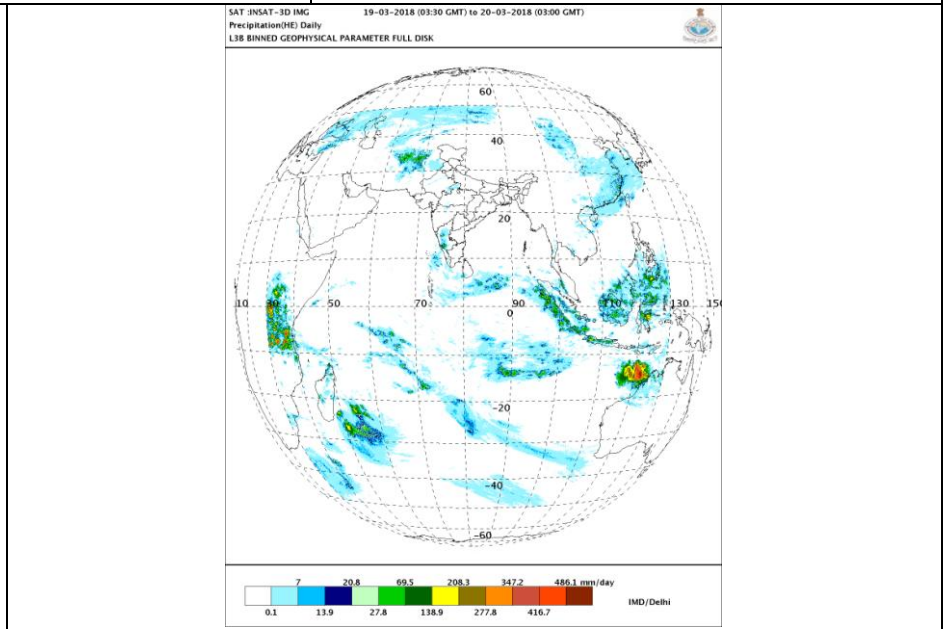
PM10 Forecast



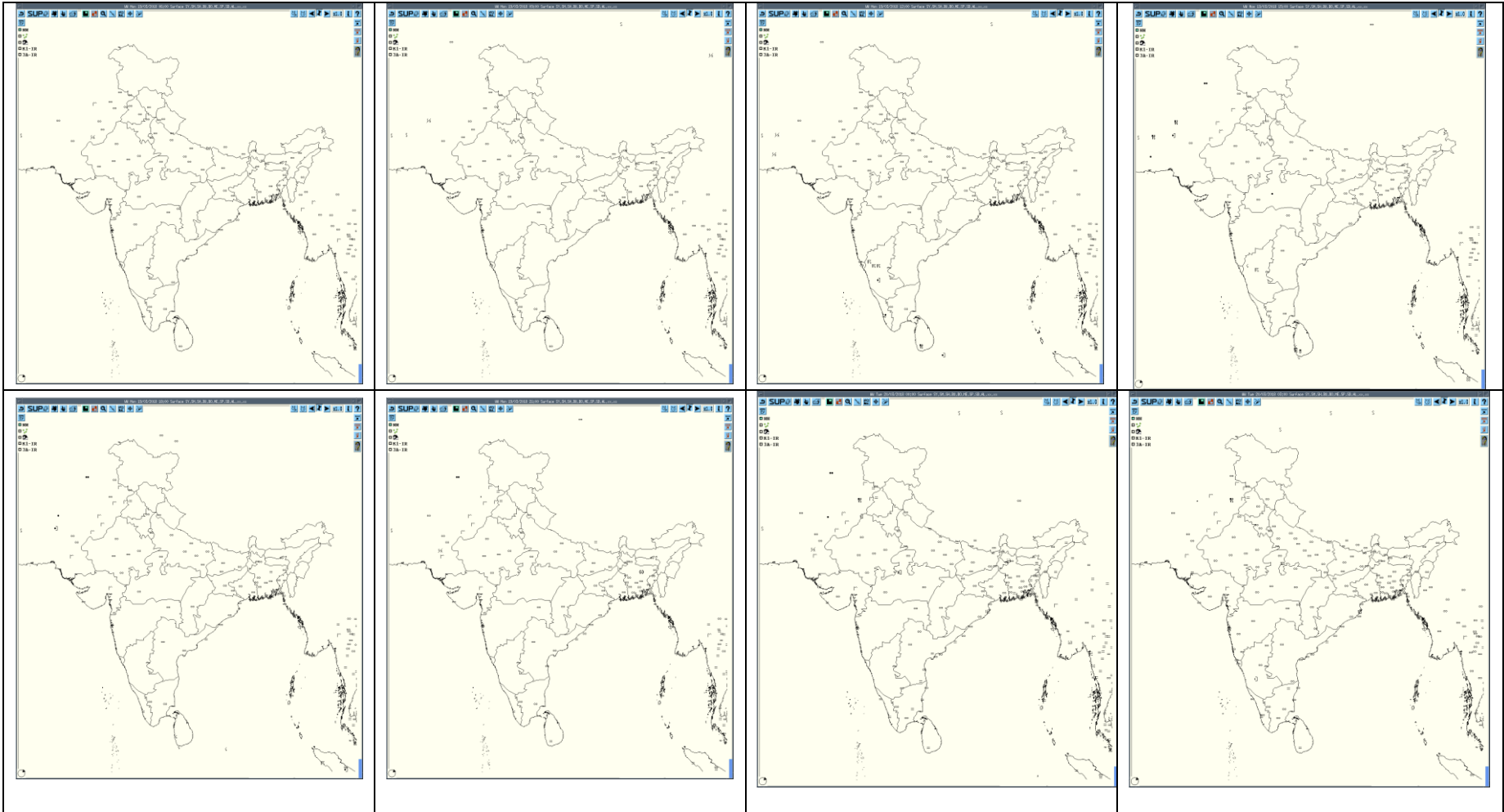
Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today



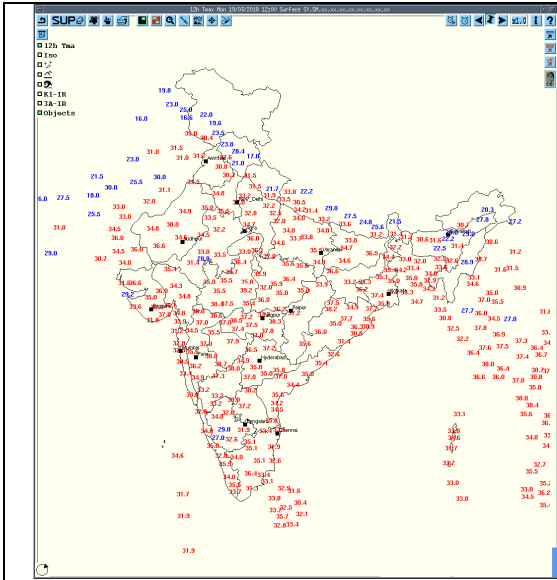
IMR



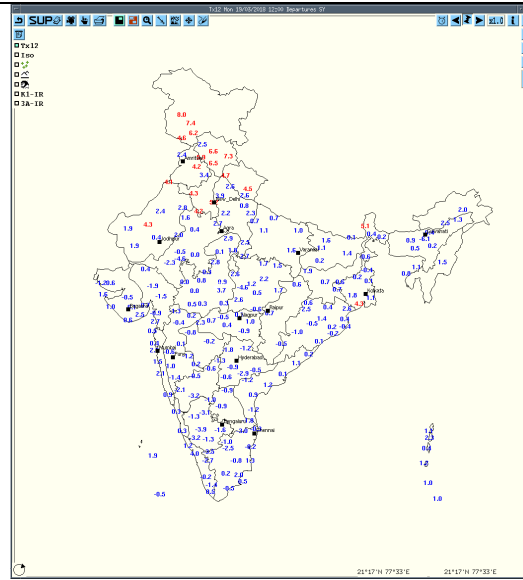
HEM



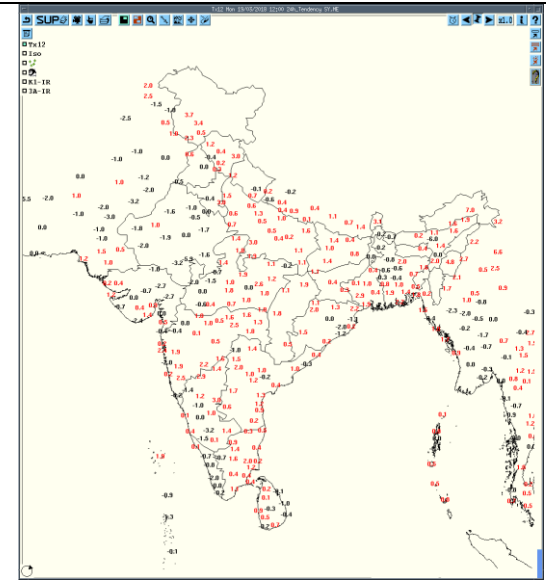
3hourly Past weather at 06, 09, 12, 15, 18, 21 UTC of yesterday and 00 & 03 hrs UTC of today



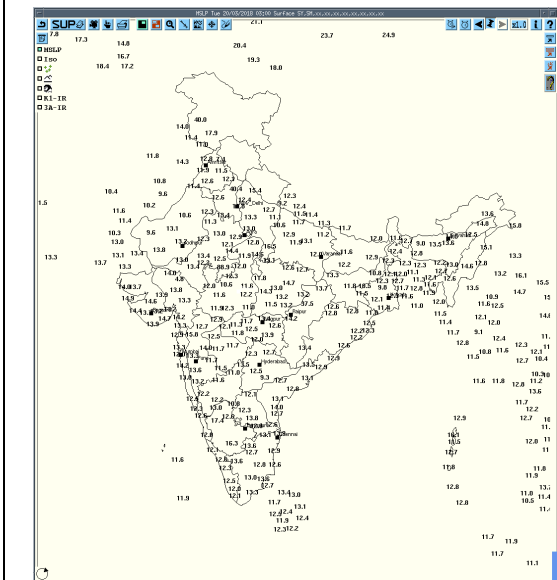
Tmax



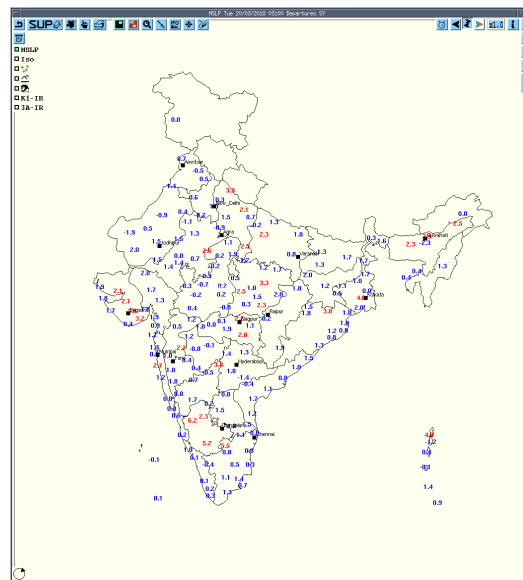
Departure Tmax



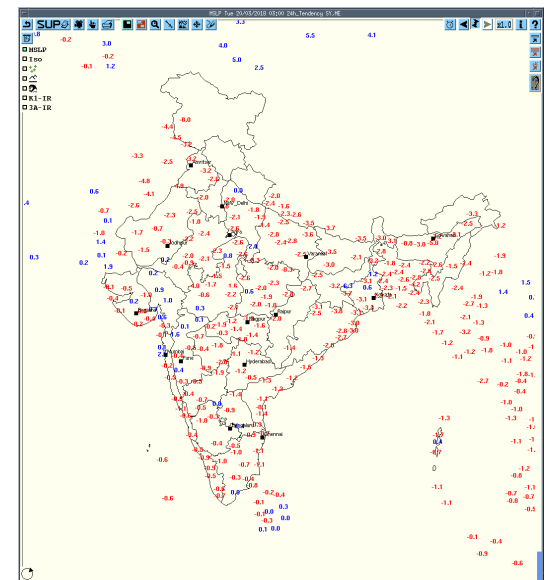
Tendency Tmax



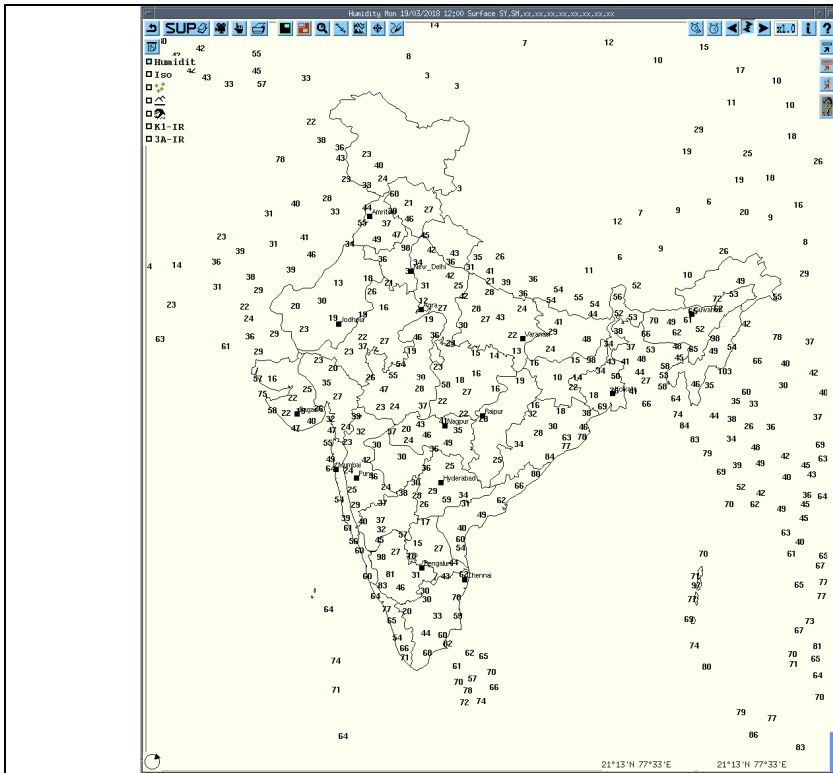
MSLP



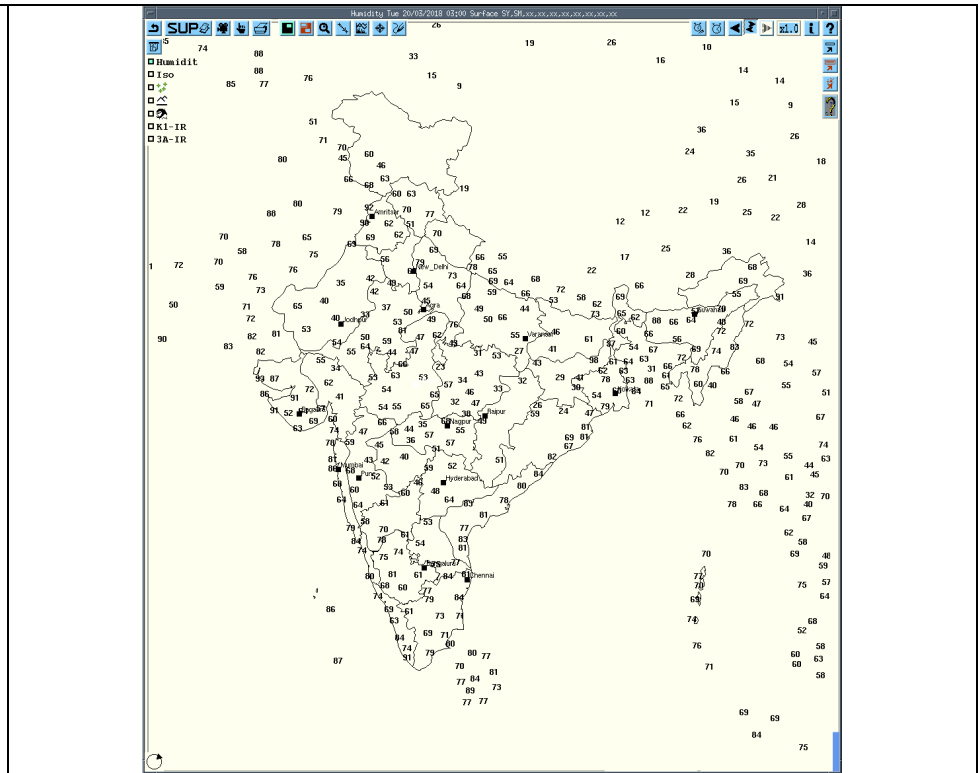
Departure MSLP



Tendency MSLP



RH at 12UTC yesterday



RH at 03UTC today

## Past 24 hours DWR Report:

DWR Station Name	Date of Report	Time Interval of Observation (UTC)	Organisation of cells (Isolated single cells/multiple cells/convective regions /squall lines) with height of 20 dBZ echo top and maximum reflectivity	Formation w.r.t. radar station and Direction of movement	Remarks	Associated Severe Weather if any	Districts affected
Agartala	20-03-18	190300-200300	No Significant Echo	--	--	--	--
Jaipur	20-03-18	190302-200302	Multiple cell with average height 4.0 km and maximum reflectivity 43.0 dBZ	Multiple cell develop from 0302 UTC of 19/03/2018 in W AND SW of Jaipur and moved E, NE wards at speed 30-35 km/hr	Cell starts forming from 16.03.2018 in W and SW of Jaipur and reaches maximum reflectivity during 1042-1602 UTC of 19/03/2018 and remain continue after 0302 UTC of 20/03/2018	Thunderstorm/rain at Isolated places	Sikar, Jaipur, Tonk, Baran, Kota, Bhilwara, Jhalawar, Chittorgarh and Dausa districts.
Lucknow	20-03-18	190300-200300	Nil	Nil	Nil	Nil	Nil
Patiala	20-03-18	190300-190600	No Echo	--	--	--	--
		190600-190900	Multiple Cells dBZ=36.0 Ht.=07-08 Km	SW Sector Movement NE			Bhiwani, Hisar, Rohtak and its adjoining area
		190900-200252	No Echo	--	--	--	--
Kolkata	20-03-18	190301-200302	Nil	Nil	Nil	Nil	Nil
Visakhapatnam	20-03-18	191200-191500	CB cell NE-ly with max reflectivity 53 dBZ and height 8kms at 135kms	-	Likely to be dissipated.	Nil	Nil
Patna	20-03-18	190300-200300	Nil	Nil	Nil	Nil	Nil

**Realised past 24hrs TS/SQ/HS Data:**

Realised TS/HS/SQ during past 24 hours ending at 0300UTC of today(received from RMCs/MCs)						
Name of Station Reporting	Region	State/Sub Division	Weather Event (TS/Hail/Squall)	Date	Time of Commencement (IST)	Time of end (IST)
Jodhpur	Northwest India	West Rajasthan	Thunderstorm	19-03-18	1256	1300
Buldana	Central India	Maharashtra (Vidarbha)	Thunderstorm	19-03-18	1830	1930
Guna	Central India	Madhya Pradesh (West)	Thunderstorm	20-03-18	0400	0500
Karipur AP	South India	Kerala	Thunderstorm	19-03-18	1410	1520
Minicoy	South India	Lakshadweep Islands	Thunderstorm	19-03-18	1231	1255
Gadag	South India	Karnataka (NIK)	Thunderstorm	19-03-18	1725 2015	1800 2100

## IMPORTANT LINKS:

For NCMRWF NWP products:(<http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php>)

For IMD NWP products:([http://nwp.imd.gov.in/diagpro\\_new.php](http://nwp.imd.gov.in/diagpro_new.php))

For Synoptic plotted data and charts

<http://amssdelhi.gov.in/>

<http://www.amsskolkata.gov.in/>

For RANDHRA PRADESHID tool:

[http://rAndhra\\_Pradeshid.imd.gov.in/](http://rAndhra_Pradeshid.imd.gov.in/)

Low Level Winds

[http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR\\_2017/?C=M;O=D](http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2017/?C=M;O=D)

Upper level winds

[http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/HLW/MAR\\_2017/?C=M;O=D](http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/HLW/MAR_2017/?C=M;O=D)

Past24hourHEMandIMRrainfall(upto03UTCoftoday)

IMR: [http://satellite.imd.gov.in/img/3Ddaily\\_imr.jpg](http://satellite.imd.gov.in/img/3Ddaily_imr.jpg)

HEM: [http://satellite.imd.gov.in/img/3Ddaily\\_he.jpg](http://satellite.imd.gov.in/img/3Ddaily_he.jpg)

ForRadarimagesofthepast24hoursincludingmosaicofimages:

[http://ddgmui.imd.gov.in/dwr\\_img/](http://ddgmui.imd.gov.in/dwr_img/)

Satellite sounder based T- Phigram

[http://satellite.imd.gov.in/mAndhra\\_Pradesh\\_skm2.html](http://satellite.imd.gov.in/mAndhra_Pradesh_skm2.html)

## WEATHER SYMBOLS:

