India Meteorological Department

FDP STORM Bulletin No. 12 (18-03-2018)

1. CURRENT SYNOPTIC SITUATION:

NWFC INFERENCE (0300UTC of the Day):

♦ The Western Disturbance as a trough in mid & upper tropospheric westerlies with its axis at 5.8 km above mean sea level roughly along Long 50°E to the north of Lat 25°N now runs roughly along Long 54°E to the north of Lat 25°N.

♦ An induced cyclonic circulation lies over south Pakistan and adjoining southwest Rajasthan and extends upto 1.5 km above mean sea level.

♦ The cyclonic circulation extending upto 0.9 km above mean sea level over southeast Rajasthan & adjoining West Madhya Pradesh has become less marked.

♦ The cyclonic circulation over eastcentral Arabian Sea & adjoining south Konkan at 1.5 km above mean sea level has become less marked. However, a trough in low level easterlies runs from Comorin area to south Madhya Maharashtra across Interior Tamilnadu and Interior Karnataka and extends upto 0.9 km above mean sea level.

♦ The trough of low at mean sea level over Equatorial India Ocean and adjoining southeast Bay of Bengal persists.

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SATELLITE OBSERVATIONS during past 24hrs and current observation:

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

WESTERN DISTURBANCE (WD):

Scattered multi-layered clouds observed over East Iran, Afghanistan, North Pakistan, and over the area between lat 40.0ºN to 47.0ºN ad long 60.0ºE to 70.0ºE in association with WD over the area.

Clouds description within India:

Scattered low/medium clouds with embedded isolated weak to moderate convection seen over Southeast North Interior Karnataka, South Kerala and extreme South Tamilnadu. Scattered low/medium clouds with embedded isolated weak convection seen over Arunachal Pradesh and Manipur. Scattered low/medium clouds were seen over Jammu & Kashmir, Northwest Odisha, South Gangetic West Bengal, Sikkim, rest North-eastern States, Gujarat, Maharashtra, rest Karnataka, Rayalaseema, North Kerala, rest Tamilnadu, and Nicobar Islands. Scattered medium/high clouds were seen over Haryana & Punjab.

Arabian Sea:

Scattered low/medium clouds with embedded moderate to intense convection seen over Southeast Arabian Sea off Kerala coast & Comorin.

Bay of Bengal & Andaman Sea:

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

Past Weather:

Convection (during last 24 hrs):

Moderate to intense convection was observed over East J&K Karnataka Rayalaseema Kerala Tamilnadu and weak to moderate convection over North Chhattisgarh Bihar Jharkhand Gangetic West Bengal Sikkim North-East States South Odisha Telangana North Coastal Andhra Pradesh.

OLR :-

Upto 230 wm^{-2} was observed over J&K North Himachal Pradesh North Uttarakhand Sikkim Arunachal Pradesh Nagaland Manipur Mizoram Kerala Tamilnadu and

Upto 250 wm^{-2} observed over South Interior Karnataka Coastal Andhra Pradesh.

Synoptic Features:

Westerly Trough: Trough in westerly roughly along Longitude 54°E & north of Latitude 25°N

Dynamic Features:

Negative shear tendency is observed over north Coastal Andhra Pradesh 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.

A positive Vorticity field is observed over Himachal Pradesh Uttarakhand Uttar Pradesh Bihar Arunachal Pradesh.

Negative Low Level Convergence is observed over J&K Uttar Pradesh East Madhya Pradesh Vidarbha and Positive Low Level Convergence over rest parts of India.

Precipitation:

IMR:

Rainfall upto 30-50 mm observed over South Kerala adjoining Tamilnadu South-East parts of South Interior Karnataka.

Rainfall upto 01-10 mm observed over J&K North-East Himachal Pradesh Arunacha Pradesh East Assam Nagaland Manipur Mizoram Rayalaseema rest East parts of South Interior Karnataka north Kerala rest Tamilnadu.

HEM:

Rainfall upto 70 mm observed over East Arunacha Pradesh South-East parts of South Interior Karnataka South Kerala Central Tamilnadu and

Rainfall upto 14 mm observed over Manipur North-East parts of South Interior Karnataka and

Rainfall upto 7 mm observed over rest North-East States Gangetic West Bengal Couth Coastal Andhra Pradesh North Kerala rest Tamilnadu.

RADAR and RAPID RGB Observation:

Isolated light echo (dBZ around 40 and height 5-6km) is seen on DWR Agartala domain at 1242IST.

RAPID RGB Satellite imagery at 1200IST indicates significant convection over Arunachal Pradesh.

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

Higher Dust concentration was observed over North Africa and Arab countries. Dust concentration is expected to increase 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.

Delhi – SAFAR analysis & Forecast	**18.03.2018**	**19.03.2018**
PM10 (micro-g/m3)	153	138
PM2.5 (micro-g/m3)	87	78

2. NWP MODEL GUIDANCE:

NCMRWF (NCUM Forecasts based on 00 UTC of the day):-

1. Weather Systems:

Low level CYCIRS, Troughs:

12 UTC of Day 2-4: 850 hPa Trough over Bangladesh and adjoining parts of NE India

00 UTC of Day 0-1: Trough at 850 hPa over Central India

Confluence & Wind Discontinuity regions:

UTC of Day 2-3: W-E wind discontinuity over peninsula from Maharashtra-MP-Chhattisgarh-Odisha

2. Location of jet and jet core (>60kt) at 500hPa:

Over SW Pakistan (Day-1) S Pakistan (Day-2) associated with WD

3. Convergence at 850 hPa:

Day/Index: Subdivisions with Lower Level Convergence > 15 x 10^-5 /s

Day0: Assam_Meghalaya, West_RJ, East_RJ, Odisha, West_MP, Madhya_Maharashtra, Marathwada, Coastal_AP,

Day1: Jharkhand, Odisha, East_MP, Vidarbha, Chhattisgarh, Coastal_AP,

Day2: NE_NMMT, Hry_Chd_Delhi, West_RJ, Odisha, West_MP, East_MP, Chhattisgarh, Coastal_AP,

Day3: Assam_Meghalaya, NE_NMMT, East_UP, West_UP, Odisha, Coastal_AP, Kerala,

Day4: East_UP, Odisha, East_MP, Vidarbha, Chhattisgarh, TN_Puducherry, SI_Karnataka, Kerala,

4. Spatial distribution of Low level Vorticity:

Day/Index: Subdivisions with Lower Level Vorticity > 15 x 10^-5 /s

Day0: Arunachal_Pradesh, Assam_Meghalaya, NE_NMMT, Sub_Himalayan_WB, Gangetic_WB, Uttarakhand, Himachal_Pradesh, West_RJ,

Day1: Assam_Meghalaya, NE_NMMT, West_UP, Uttarakhand, Himachal_Pradesh, East_RJ, Coastal_AP,

Day2: Assam_Meghalaya, Bihar, Uttarakhand, Hry_Chd_Delhi, Punjab, Himachal_Pradesh, West_RJ, Odisha, Coastal_AP,

Day3: Gangetic_WB, Jharkhand, East_UP, West_UP, Punjab, Odisha, Coastal_AP,

Day4: NE_NMMT, Punjab,

5. Showalter Index: -3 to -4[Very unstable]:

Day/Index: Subdivisions with Showalter Index < -4

Day0: NE_NMMT, Coastal_Karnataka, SI_Karnataka, Kerala,

Day1: Arunachal_Pradesh, Sub_Himalayan_WB, TN_Puducherry, Coastal_Karnataka, NI_Karnataka, SI_Karnataka,

Day2: Arunachal_Pradesh, Sub_Himalayan_WB, Uttarakhand, Jammu_Kashmir, Coastal_Karnataka, SI_Karnataka, Kerala,

Day3: Arunachal_Pradesh, Sub_Himalayan_WB, Uttarakhand, Jammu_Kashmir, Coastal_Karnataka, SI_Karnataka, Kerala,

Day4: Arunachal_Pradesh, Assam_Meghalaya, Sub_Himalayan_WB, Jharkhand, SI_Karnataka, Kerala,

6. K-Index :> 35[Very Unstable thunderstorm likely]:

Day/Index: Subdivisions with K Index > 40

Day0: Madhya_Maharashtra, TN_Puducherry, SI_Karnataka,

Day1: Arunachal_Pradesh, Sub_Himalayan_WB, Madhya_Maharashtra, Marathwada, Rayalseema, NI_Karnataka, SI_Karnataka,

Day2: Arunachal_Pradesh, Sub_Himalayan_WB, Madhya_Maharashtra, Marathwada, Vidarbha, Coastal_Karnataka, NI_Karnataka, SI_Karnataka,

Day3: Arunachal_Pradesh, Sub_Himalayan_WB, East_MP, Madhya_Maharashtra, Vidarbha, Chhattisgarh, Coastal_AP, Telangana, Rayalseema, TN_Puducherry, NI_Karnataka, SI_Karnataka, Kerala,

Day4: Arunachal_Pradesh, Sub_Himalayan_WB, Gangetic_WB, Odisha, Coastal_AP, Telangana, Rayalseema, TN_Puducherry, NI_Karnataka, SI_Karnataka, Kerala,

7. Spatial distribution of TTI: TTI >50 [Scattered Thunderstorms few severe]:

Day/Index: Subdivision with Total Totals Index > 52

Day0: Arunachal_Pradesh, Assam_Meghalaya, NE_NMMT, Himachal_Pradesh, Jammu_Kashmir,

Day1: Arunachal_Pradesh, NE_NMMT, Sub_Himalayan_WB, Uttarakhand, Himachal_Pradesh, Jammu_Kashmir,

Day2: Arunachal_Pradesh, Sub_Himalayan_WB, Uttarakhand, Punjab, Himachal_Pradesh, Jammu_Kashmir, West_RJ,

Day3: Arunachal_Pradesh, Sub_Himalayan_WB, Uttarakhand, Hry_Chd_Delhi, Punjab, Himachal_Pradesh, Jammu_Kashmir, East_MP, Vidarbha, Chhattisgarh,

Day4: Arunachal_Pradesh, Assam_Meghalaya, Sub_Himalayan_WB, Gangetic_WB, Jharkhand, Bihar, East_UP, West_UP, Uttarakhand, Punjab, Himachal_Pradesh, Jammu_Kashmir, Odisha, Chhattisgarh,

8. Rainfall and thunder storm activity:

Day/Index: Subdivisions with Precipitation > 2 cm

Day1: Arunachal_Pradesh, Assam_Meghalaya, TN_Puducherry, SI_Karnataka, Kerala,

Day2: Uttarakhand, Himachal_Pradesh, Jammu_Kashmir,

Day3: Jammu_Kashmir,

Day4:

Day5:

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

1. Synoptic Systems:

The analysis based on 00 UTC shows a cyclonic circulation over Madhya Maharashtra and adjoining areas in the lower troposphere. However, a trough in lower level easterlies runs from the cyclonic circulation over Madhya Maharashtra up to costal Kerala across costal and Interior Karnataka. This trough persists in day 1 and 2 as the cyclonic circulation moved northward over south Madhya Pradesh. In day 3, the trough changes its orientation as the cyclonic circulation moved eastward over northeast Madhya Pradesh. An induced cyclonic circulation is seen over south Pakistan and adjoining southwest Rajasthan. This cyclonic circulation moves north-eastward direction over west Rajasthan during next 2 days as the western disturbance also moves north-eastward direction. In the lower troposphere, a north-south oriented trough running from Assam and adjoining areas to GWB persists for next 2 days moving a little eastward in day 2. In day 3, a feeble cyclonic circulation is seen over GWB and adjoining Jharkhand region.

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^{-1}/s)}:

Mostly along foothills of Himalayas and associated with the cyclonic circulations and along the trough situating over central and eastern India 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 coastal areas of Gangetic West Bengal, Orissa, Andhra Pradesh, Kerala, Karnataka and Konkan & Goa during all 3 days.

Lifted Index (< -2): The spatial coverage of the index exceeding threshold value is nearly similar to T-storm Initiation index.

Total Total Index (> 50) : Above threshold value over NW and East India during next 3 days. The maximum values are found along the foothills of Himalayas over northwest India and over GWB region.

Sweat Index (> 300): Parts of NE states**.** Coastal areas of GWB, Kerala, Karnataka and Konkan & Goa for next 3 days. Parts of Sourashtra and Kutch on day 1 and 2. Over southern parts of peninsular India and over Marathawada, Madhya Maharashtra and adjoining Vidharbha and Madhya Pradesh on day 1 and 2. Seen over Jammu & Kashmir on day 3.

CAPE (> 1000): Mostly along southern parts peninsular India along west coast and over east coastal areas of GWB and Orissa during all 3 days.

CIN (50-150): Mostly over parts of north eastern states and along east coast; along west coast from Sourasthtra & Kutch to coastal Karnataka during next 3 days.

5. Rainfall Activity:

10- 40 mm rainfall: On day 1, Kerala and adjoining Interior Tamilnadu and Karnataka on day 1. The rainfall activity reduces over the region on day 2 and further on day to confine over Kerala only.

Up to10 mm rainfall: On day 1, over Arunachal Pradesh and NNMT region and over rest of the Karnataka, Konkan & Goa, Marathawada and adjoining Madhya Maharashtra. The rainfall activity over the region in peninsular India continues in day 2 with a considerable reduction in spatial coverage. On day 3, over J & K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, west Uttar Pradesh and adjoining north Rajasthan.

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

1. Model Reflectivity (Max.dBz):

> 25 dBZ Model Reflectivity: On day 1, over parts of interior Tamilnadu and Interior Karnataka and adjoining Marathawada and Kerala; Over parts of Arunachal Pradesh. On day 2, over some parts of west Madhya Pradesh and adjoining Rajasthan. On day 3, over parts of J & K and adjoining Punjab and Himachal Pradesh.

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 during all three days. The maximum values are found over northwest India.

K-Index (> 35): Less than threshold value is observed over the country during the next 3 days except over parts Karnataka, Marathawada, Madhya Maharashtra, adjoining Tamilnadu, Rayalaseema, Telangana and Vidharbha. From day 2 onwards it remains over northern parts of above mentioned region.

CAPE (> 1000): Greater than threshold value over the southern part of west coast, east coast, and parts of Kerala and coastal Karnataka and adjoining interior Karnataka during the next 3 days. Over Tripura on day 1.

CIN (50-150): Mostly over a few pockets along coastal areas of India during next 3 days. Day 2 onwards, some places over Punjab, Rajasthan, Madhya Pradesh and adjoining Maharashtra region.

3. Rainfall and thunderstorm activity:

10- 40 mm rainfall: On day 1, Kerala and adjoining Interior Tamilnadu and Karnataka on day 1. The rainfall activity reduces over the region on day 2 and further on day to confine over Kerala only. On day 3, over parts of Jammu and Kashmir.

Up to10 mm rainfall: On day 1, over Arunachal Pradesh and NNMT region and over rest of the Karnataka, Konkan & Goa, Marathawada and adjoining Madhya Maharashtra. The rainfall activity over the region in peninsular India continues in day 2 with a considerable reduction in spatial coverage. On day 3, over J & K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, west Uttar Pradesh and adjoining north Rajasthan.

3. IOP ADVISORY FOR 24 and 48Hrs:

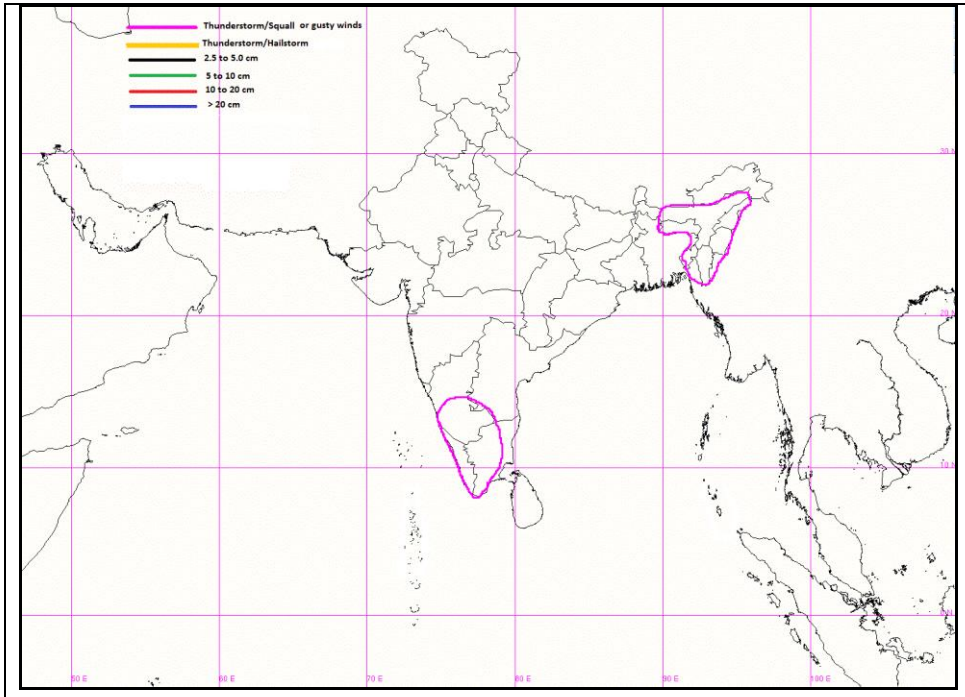
Summary and Conclusions:

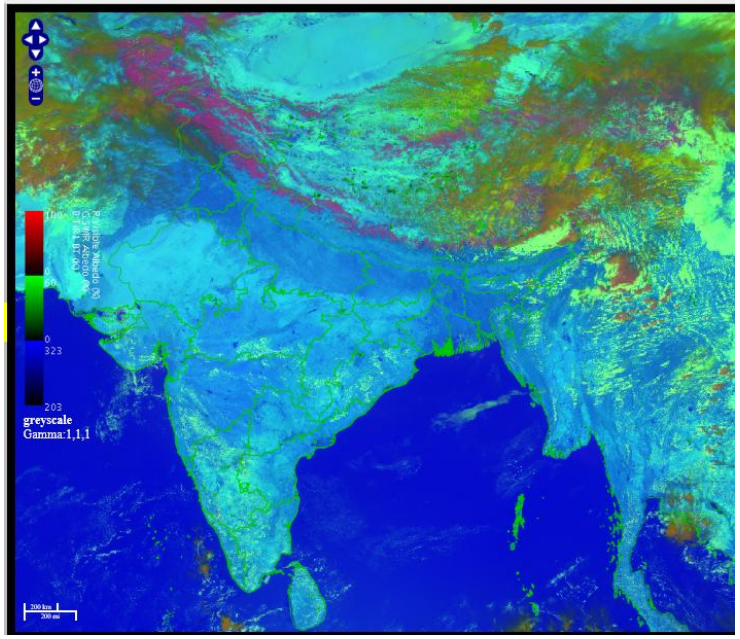
Day-1 & Day-2:

A trough in low level easterlies runs from Comorin area to south Madhya Maharashtra across Interior Tamilnadu and Interior Karnataka and extends upto 0.9 km above mean sea level. From the satellite observation, scattered low/medium clouds with embedded moderate to intense convection were seen over Southeast Arabian Sea off Kerala coast & Comorin. Scattered low/medium clouds with embedded isolated weak convection were also seen over Assam, Meghalaya, Mizoram and Nagaland. From the NWP models inference, a trough in lower level and the cyclonic circulation are seen over Madhya Maharashtra up to costal Kerala across costal and Interior Karnataka. This trough persists in day 1 and 2 as the cyclonic circulation moved northward over south Madhya Pradesh. Positive vorticity seen mostly along foothills of Himalayas and associated with the cyclonic circulations and along the trough situating over central and eastern India during next 3 days. Therefore, the parts of central and adjoining peninsular India is likely to experience isolated thunderstorms with gusty winds on Day-1. Similarly, Assam, Meghalaya, Mizoram and Nagaland may also experience thunderstorms with gusty winds on Day-1. The probability of thunder activity due to the present synoptic conditions is unlikely on Day-2.

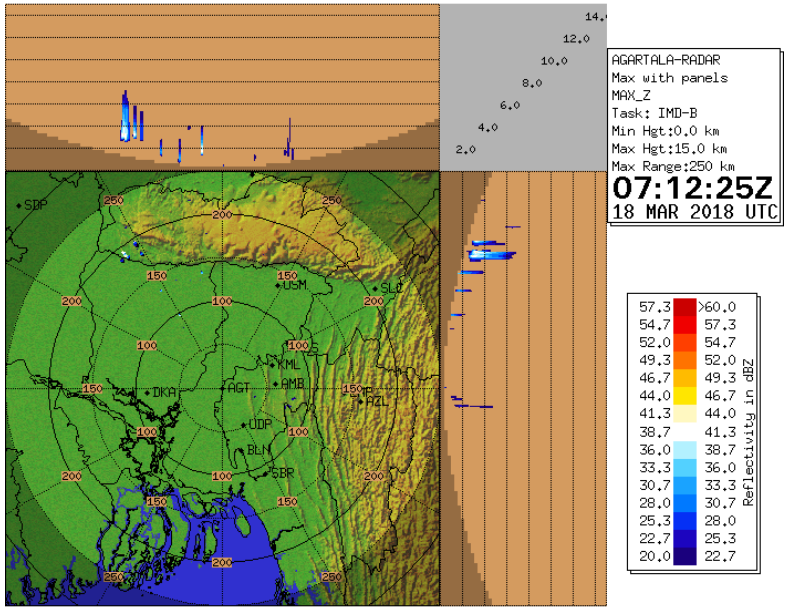
24 hour Advisory for IOP:	**48 hour Advisory for IOP:**
Rainfall: Nil **Thunderstorm with associated phenomenon:** Kerala, Interior Tamilnadu, South Interior Karnataka, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura.	**Rainfall:** Nil **Thunderstorm with associated phenomenon:** Nil

Graphical Presentation of Potential Areas for Severe Weather:

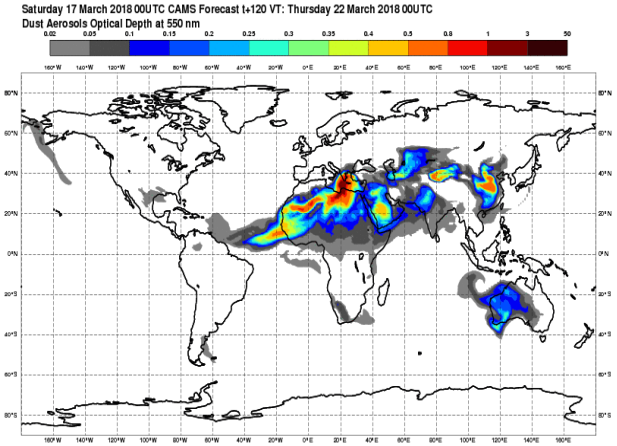
	**NO WARNING FOR SEVERE WEATHER**
IOP Advisory for 24 hours	**IOP Advisory for 48 hours**



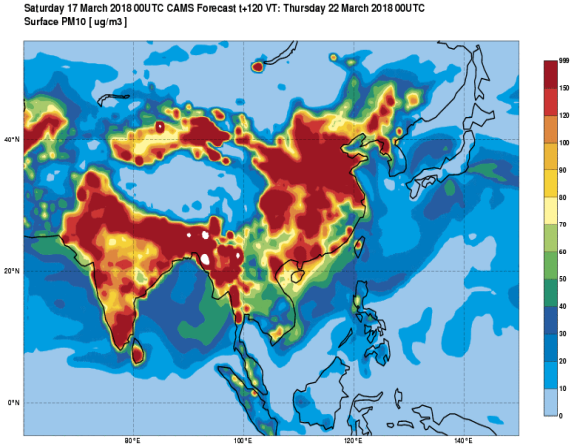
RAPID RGB Imagery at 1200 IST of the Day



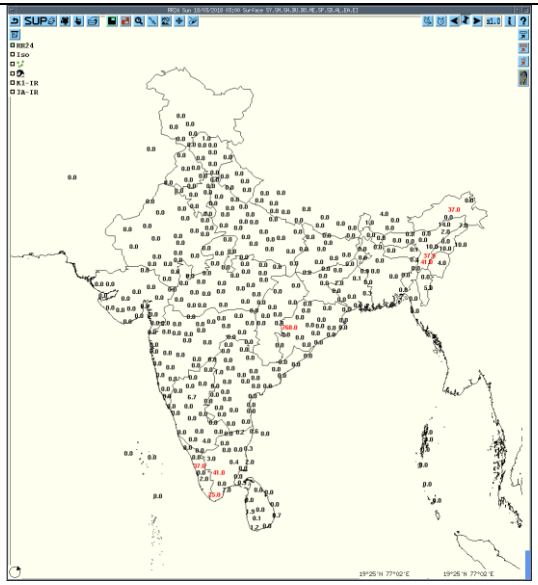
DWR Agartala at 1242IST of the Day



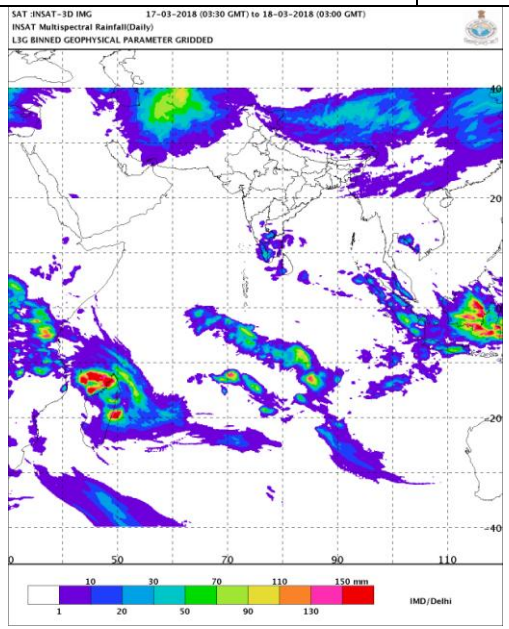
Forecast Dust Concentration



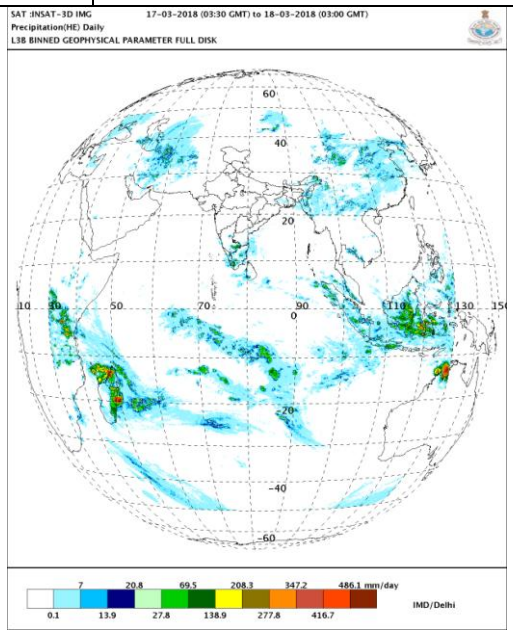
PM10 Forecast



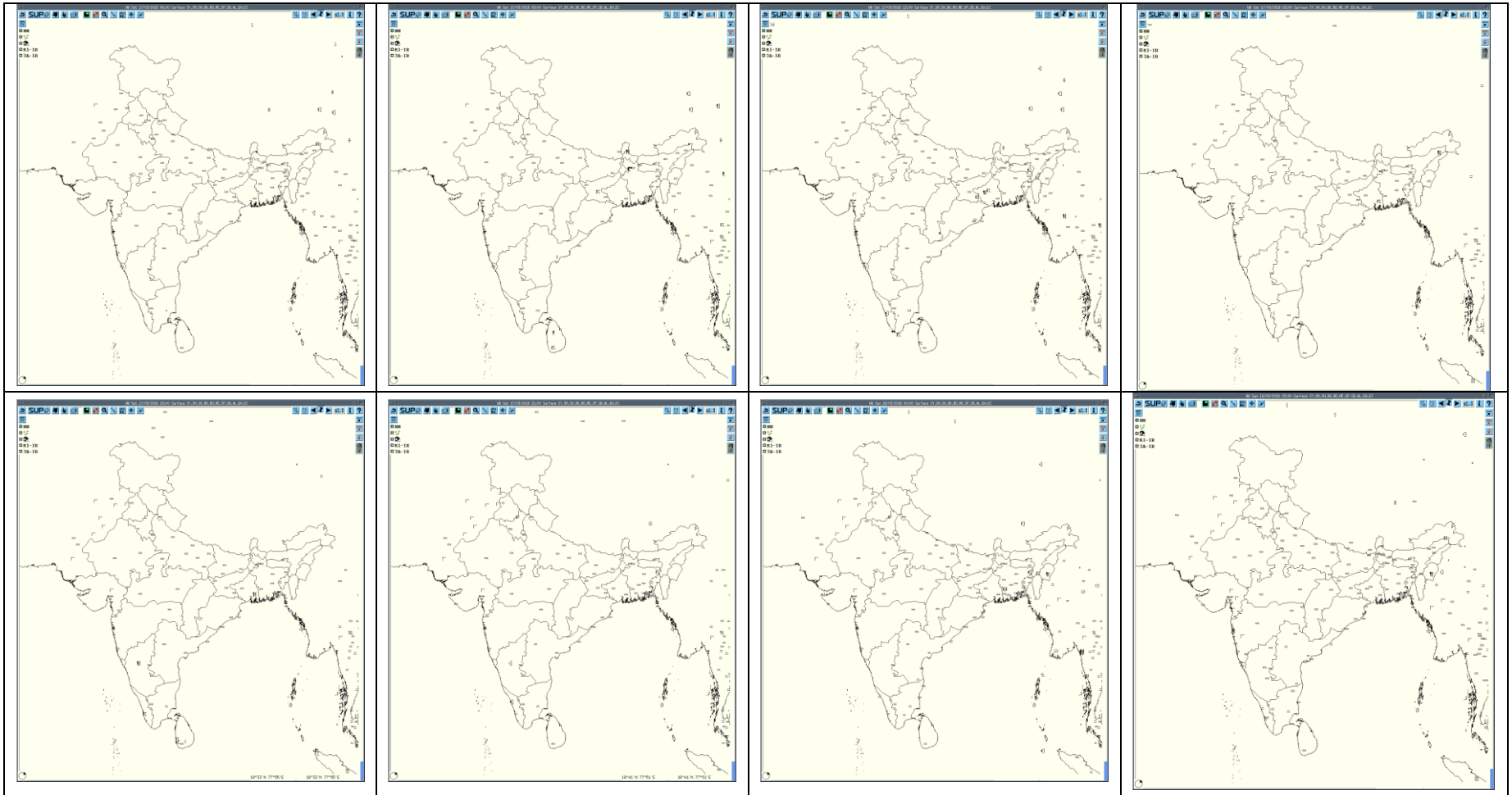
Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today



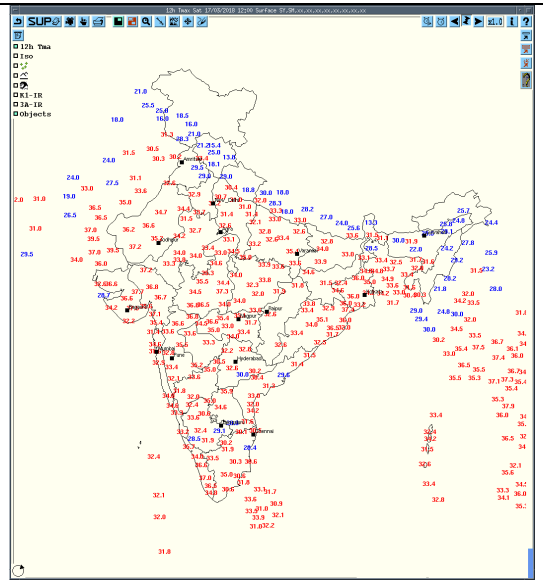
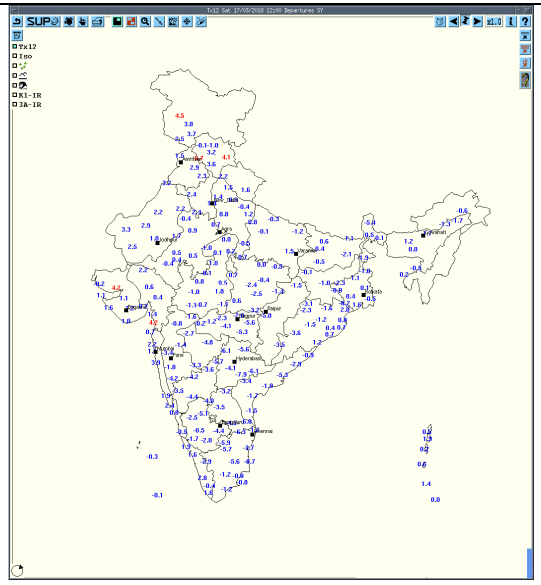
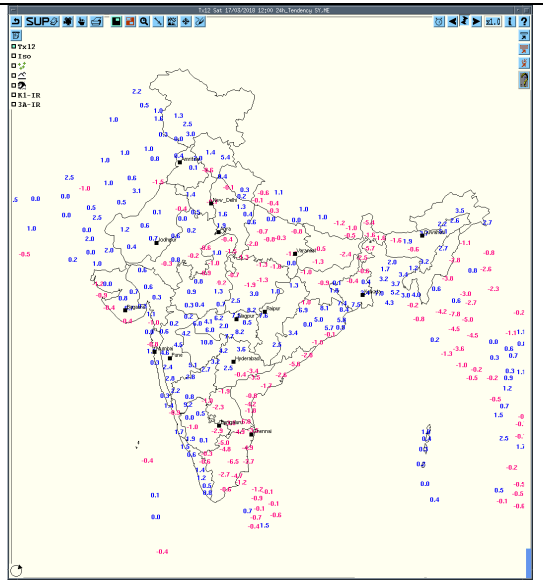
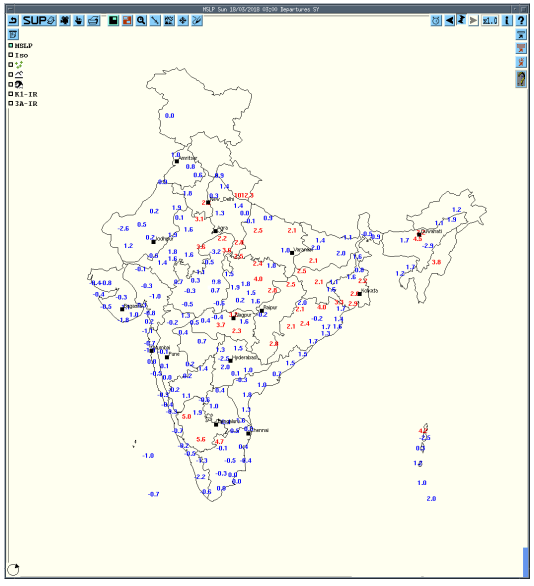
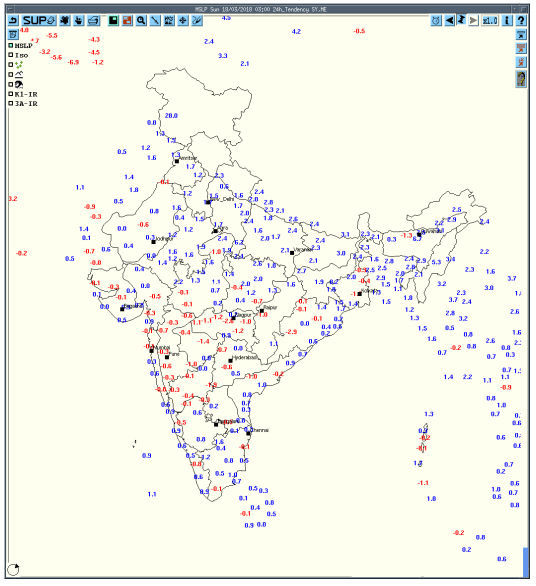
IMR

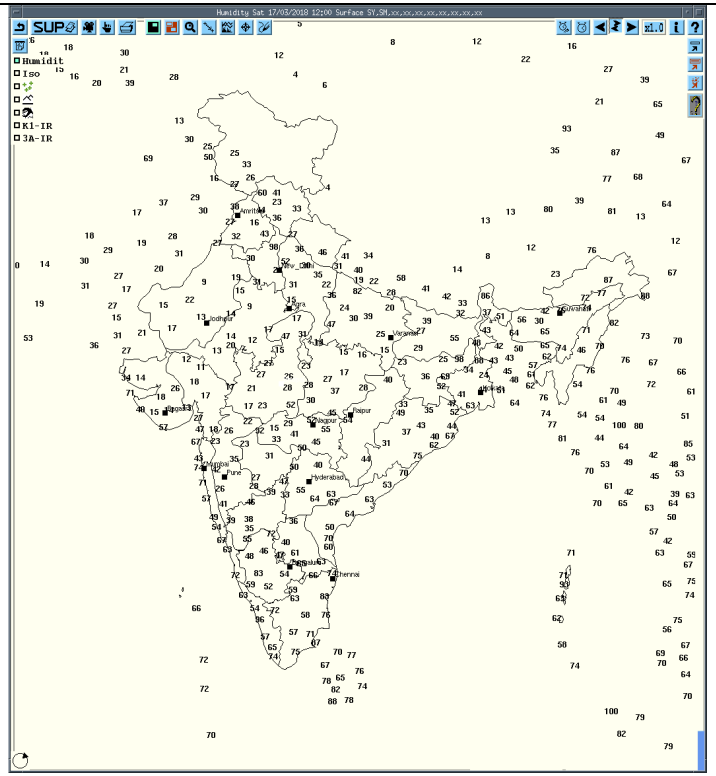
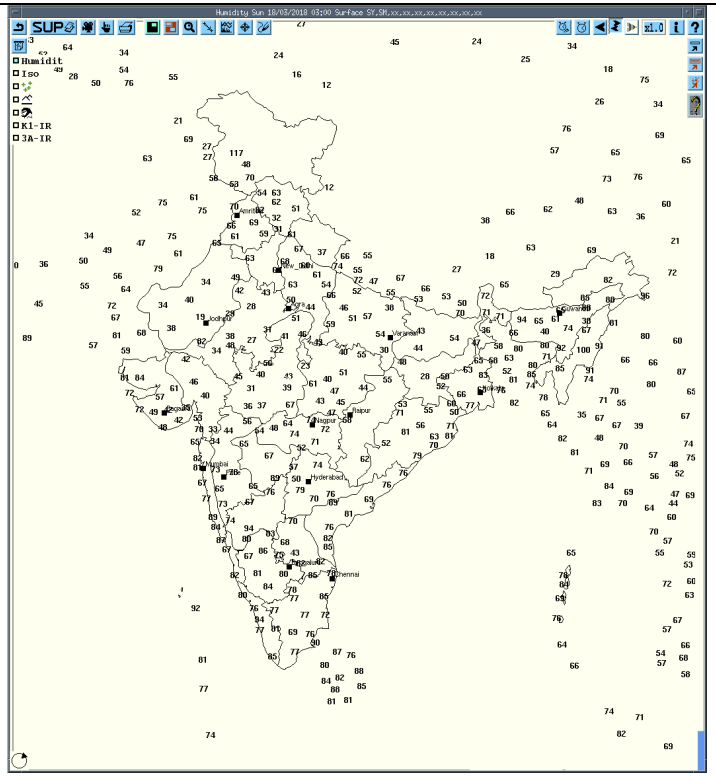


HEM



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	18-03-18	170300-180300	ISLTD SINGLE, 53 dBz, 10 kms	220 Kms S near BLN at 0622 UTC /30 Kmph E'ly	Dissipated at 171202 UTC over SE at 200kms	Not known.	Not Known.
			Multiple Cell ,58 dBZ,14 Kms	160 Kms NE /35 Kmph,E'ly	Cell persists at 171432 UTC	Not known.	Not Known.
			Multiple Cell ,55 dBZ,11 Kms	150 Kms NE /40 Kmph, E'ly	Dissipated at 180252 UTC over E at 250kms	Not known.	Not Known.
Patna	18-03-18	170300 - 170450	Multiple Cells Maximum Reflectivity : 35.0 dBZ Echo Top : 5.0 KM	Range : 15 KM from DWR Patna in North-East Movement WEST TO EAST	N/A	N/A	PATNA,NALANDA, SHEIKHPURA, BEGUSARAI
		170450-170550	NIL	N/A	N/A	N/A	N/A
		170550-170620	Single Cell. Maximum Reflectivity : 28.0 dBZ Echo Top : 5.5 KM	Range : 165 KM from DWR Patna in North-East Movement WEST TO EAST	N/A	THUNDERSTORM WITH RAIN	JAMUI, LAKHISARAI, BANKA & BHAGALPUR
		170620-180300	NIL	N/A	N/A	N/A	N/A

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
Kolkata	18-03-18	170301–171001	NIL	NIL	NOSIG ECHO	NIL	NIL
		171001-171652	Isolated single cells, transformed into big cell system with maximum reflectivity of 65.5 dBz at 1401 UTC and maximum height of 11.38 km at 1301 UTC	WEST (233.2 km) moving in East-ly direction.	Isolated single cells formed in WEST at a distance of 233.2 km from Radar at 1001 UTC, Matured and dissipated at 1622 UTC in NE at a distance 121.9 km from radar.	Thunderstorm /Squall/ Rain / Hail	N/A
			Isolated single cells, merged to form single cell with maximum reflectivity of 66.0 dBz at 1341 UTC and maximum height of 10.75 km at 1422 UTC	W (117.9 km) to WSW (131.3 km) moving in East-ly direction.	Isolated single cells formed from W /117.9 km to WSW / 131.3 km Radar at 1252 UTC, Merged matured and dissipated at 1652 UTC in ENE at a distance 049.2 km from radar.	Thunderstorm /Squall/ Rain / Hail	N/A
		171702–172352	NIL	NIL	NOSIG ECHO	NIL	NIL
		180001–180301	NIL	NIL	NOSIG ECHO	NIL	NIL
Visakhapatnam	18-03-18	170600-180900	Conviction region with max reflectivity 40dbz and average height 5 kms at a distance of 30kms.	Moving ENE ly	dissipating	NIL	NIL
		170900-181200	Conviction region with max reflectivity 43dbz and height 9 kms at a distance of 238kms.	Moving E ly	dissipating	NIL	NIL
Jaipur	18-03-18	170300 - 180300	Nil	Nil	Nil	Nil	Nil
Lucknow	18-03-18	170300 - 180300	Nil	Nil	Nil	Nil	Nil
Patiala	18-03-18	170300 - 180252	No Echo	--	--	--	--

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)
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/
Low Level Winds
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
Past24hourHEMandIMRrainfall(upto03UTCoftoday)
IMR: http://satellite.imd.gov.in/img/3Ddaily_imr.jpg
HEM: http://satellite.imd.gov.in/img/3Ddaily_he.jpg
ForRadarimagesofthepast24hoursincludingmosaicofimages:
http://ddgmui.imd.gov.in/dwr_img/
Satellite sounder based T- Phigram
http://satellite.imd.gov.in/mAndhra_Pradesh_skm2.html

WEATHER SYMBOLS: