India Meteorological Department

FDP STORM Bulletin No. 18(23-03-2017)

1. CURRENT SYNOPTIC SITUATION at 0300 UTC of 23-03-2017:

SYNOPTIC FEATURES:

The Western Disturbance as an upper air cyclonic circulation over north Pakistan and adjoining Jammu & Kashmir extending upto 3.1 km above mean sea level persists with a trough aloft runs roughly along longitude 70.0°E and north of latitude 30.0°N.
The induced upper air cyclonic circulation over Central Pakistan & adjoining West Rajasthan extending upto 1.5 Km above mean sea level persists.
A trough runs from northeast Madhya Pradesh to Assam with an embedded upper air cyclonic circulation over northern parts of Bangladesh and adjoining Sub-Himalayan West Bengal and extends
upto 0.9 km above mean sea level.
An upper air cyclonic circulation lies over coastal Karnataka & neighbourhood and extends upto 0.9 km above mean sea level.
The trough in lower level easterlies from Lakshadweep area to south interior Karnataka now runs from southeast Arabian sea to north interior Karnataka with an embedded upper air cyclonic circulation over coastal Karnataka & neighbourhood and extends upto 0.9 km above mean sea level.
The upper air cyclonic circulation over Interior Karnataka & neighbourhood extending upto 1.5 Km above mean sea level has become less marked.

SATELLITE OBSERVATIONS during past 24hrs and current observation:

Clouds (based on 0900 UTC imagery of INSAT3D):

Scattered multi/layered clouds were seen over west Rajasthan, J & K and Himachal Pradesh in association with western disturbance over the area. Scattered low/medium clouds with embedded isolated moderate to intense convection over north Uttarakhand (minimum CTT minus 54º C). Scattered low/medium clouds over Punjab, Sub-Himalayan West Bengal, Sikkim and north-eastern states.

Arabian Sea:

No significant clouds over the region.

Bay of Bengal & Andaman Sea:

No significant clouds over the region.

Convection: OLR: -

Moderate to Intense convection was observed over North West parts of India.
Moderate convection was observed over Kerala adjoining South Interior Karnataka.

OLR:- Upto 340 wm^{-2} was over Gujarat Madhya Pradesh Maharashtra Chhattisgarh Jharkhand adjoining Bihar Odisha Andhra Pradesh Telangana North Karnataka, upto 310 wm^{-2} was over Rajasthan South Uttar Pradesh South Bihar North Tamilnadu, upto 300 wm^{-2} was over North Uttar Pradesh Assam Meghalaya Mizoram South Karnataka South Tamilnadu, upto 290 wm^{-2} was over Haryana Extreme North West Uttar Pradesh, upto 280 wm^{-2} was over Punjab Kerala and upto 200 wm^{-2} was over J & K, North Himachal Pradesh.

Jet Stream:

Jet stream was observed over Punjab and N/hood.

Dynamic Features:

A positive vorticity field is seen over East Uttar Pradesh Bihar West Bengal and Gujarat.

Moderate wind shear observed over Central India and Low wind shear is observed over North and South India.

Positive shear tendency observed over India except North West India and West Bengal..

Precipitation:

IMR: Rainfall upto 50mm was observed over North West Jammu Kashmir, Rainfall upto 20mm was observed over Central J&K and Rainfall upto 10mm was observed over Rest J&K North Himachal Pradesh North Kerala adjoining South Karnataka

HEM: Rainfall up to 139 mm was observed over West J&K North West Himachal Pradesh Rainfall up to 14 mm was observed over North Kerala adjoining South Karnataka

RADAR and RAPID observation:

Isolated convective clouds were observed over Uttarakhand in DWR Composite at 1620hrs IST and RGB satellite imagery at 1600hrs IST.

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

No significant dust concentration observed over Arabian Peninsula and west Rajasthan. No significant change in dust concentration expected over northern India for next three days.

2. NWP MODEL GUIDANCE:

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

1. Weather Systems:

12UTC Charts on all days from Day0-4 show feeble trough in MSLP over J & K

12UTC charts on all days from Day0-4 show wind discontinuity at 925 hPa over Maharashtra adjoining Karnataka and Telangana, MP- Chhattisgarh adjoining Jharkhand and Odisha. Similar features are also reflected at 850 hPa on all days.

850hPa anticyclonic flow lies over Arabian Sea on all Days; Localized weak, cyclonic flow over East UP and adjoining Bihar at 00UTC on Day-3 and Day-4 which is seen over W Bengal on Day-5

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

Weak in magnitude on all Days. Well defined anticyclonic flow centred on Gujarat. Peak winds of jet core >60kt at 00UTC on Day-4 over J&K adjoining Punjab and Pakistan

3. Convergence at 850 hPa:

Strong low level convergence in land all along the west coast on all days at 12UTC.

4. Low level Vorticity:-Positive Vorticity (>15 x 10^{-5}/s):

Lower values at 12UTC on all days.

At 00UTC high values along the westcoast over peninsula and EW along the line of low level discontinuity.

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

Day-0 & 1: Along west coast in Kerala and Karnataka, parts of AP adjoining Odisha and some locations in WB

Day-2 & 3: Most parts of NE India and some locations of Odisha and WB

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

Day-0&1: Along west coast in Kerala and Karnataka, parts of AP adjoining Odisha and some locations in WB

Day-2 & 3: Most parts of NE India and some locations of Odisha and WB.

7. Spatial distribution of TTI:.

TTI >44 [Scattered Numerous Thunderstorms] : All along west coast in Karnataka and Kerala

TTI >50 [Scattered Thunderstorms few severe] : Large part of J & K, HP and Uttrakhand in Day-0 all shifting SE wards in Day-1 (over UP and Bihar) and 2 large parts of Bangladesh and NE India and so in Day-3.

8. Rainfall and thunder storm activity:

Day-1-2: Light rains over J & K and along west coast in Karnataka and Kerala

Day-2:(>2cm/day)Arunachal, and in Day-3 over Meghalaya, Assam and Arunachal

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

1. Weather Systems: In the analysis, a CYCIR over GWB and adjoining areas is noticed with presence of north-south trough along north Odisha, GWB, Jharkhand and Bihar. A quasi-stationary CYCIR with north-south trough is also seen over interior Karnataka, Marathwada and adjoining areas in the analysis. A CYCIR is seen during day 1 and the trough orientation is from GWB to Chhattisgarh, south MP and adjoining areas and it is prominent till day 3.

2. Location of jet and jet core at 500 hPa:**-500 hPa Jet core (>60kt):** The Jet at 500 hPa is observed over a small pocket in Rajasthan in the analysis. It is also observed over a small belt over Bihar region on day 2.

3. Low level Vorticity:-Positive Vorticity 850hPa (>12 x 10^{-1}/s): Mainly along foothill of Himalayas during next 5 days. The pocket of vorticity maxima is concentrated towards Bihar, Jharkhand, GWB, Odisha, Chhattisgarh, east MP region during the morning hours on most of next 5 days.

4. Spatial distribution of T-Storm Initiation Index, Lifted Index, Total Total Index, CAPE, CINE and Sweat Index (High potential for thunderstorm]:

T-Storm Initiation Index (> 4): No significant zone is seen over the country during next 2 days. However, after the 48hr forecasts some regions over the eastern coastal belt including Odisha, GWB and adjoining regions indicate the value higher than 4.

Lifted Index (< -2): The areas with index less than -2 lies along east coast regions for next 5 days with gradually the LI areas with less than -2 mainly concentrated over GWB, Odisha, coastal AP and adjoining areas after day 2.

Sweat Index (> 400): Then significant zones are confined along south east coast of India over Andhra coast during initial 2 days and subsequently the maxima belts lie over GWB, Orissa and adjoining regions till day 5. The index crosses threshold over J & K and adjoining areas from day 1 - 4. Some parts of western Gujarat states also crosses the threshold values during day 4.

Total Total Index (> 50): Above threshold value in some parts of central India adjoining parts of the country from day 1 up to day 5 particularly at 12 UTC of each day.

CAPE (> 1000): Mostly along south east coast of India over south AP and adjoining TN coast during next 2 days. Subsequently the maximum CAPE is noticed over Gangetic West Bengal, Orissa and adjoining regions during day 3-5. The CAPE values also above threshold over Kerala and parts of coastal Karnataka, Konkan-Goa during day 3-5.

CIN (50-150): Maximum CIN values are found in some areas along east coast over GWB, Odisha, coastal AP and Tamilnadu from Day-1 to Day-5. The CIN values are higher along west coast and maxima over costal Gujarat and adjoining west Rajasthan.

5. Rainfall and thunderstorm activity: Upto 10mm rainfall is observed over Kerala and J & K region during the next 24 hours. Subsequently for the next three days, rainfall is mainly over NE states.

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

1. Model reflectivity (Max. dBz): **(>25 dBz)** mainly over some parts of NE states during the next 2 days with some parts of J&K exceeding the threshold value on the evening of day 2.

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

Total Total Index (> 50): Above threshold value over most parts of India during next 3 days except parts of extreme south peninsular region and northeastern states during morning hours.

K-Index (> 35): Less than threshold value over most parts of India during next 3 days.

CAPE (> 1000): Mostly along south east coast of India over Andhra Pradesh and Tamilnadu during next 3 days along with another zone over west coast over Kerala, coastal Karnataka, Konkan & Goa.

CIN (50-150): CIN values are mostly small all over India during all three days of forecasts except some areas along coastal areas of India over Odisha, coastal AP, coastal Karnataka and Konkan-Goa and some parts of UP, Haryana, Punjab and adjoining Rajasthan.

5. Rainfall activity: - Rainfall activity (~ 10-40 mm) over J & K region during next 3 days. Rainfall over NE states mainly on day 3.

ECMWF Forecasts based on 0000 UTC of 22nd March 2017

Mean sea level:

No significant systems over Indian region till 28th March 2017.

Lower Level Winds (925 hpa & 850 hpa)

An induced upper air cyclonic circulation is seen over south western parts of Pakistan and adjoining southwest Rajasthan on 23rd March and seen over southwest Rajasthan & neighbourhood on 24th March and has become less marked thereafter.

An upper air cyclonic circulation is seen over West Madhya Pradesh on 23rd March and has become less marked thereafter.

A trough in lower level easterlies is seen running from Lakshadweep area to south Konkan & Goa on 23rd March and has become less marked thereafter.

An upper air cyclonic circulation is seen over Jharkhand and neighbourhood on 23rd March and persisted over the same region till 24th March and has become less marked thereafter.

Another upper air cyclonic circulation is seen over Chhattisgarh and adjoining Odisha on 25th March and over Odisha and adjoining Chhattisgarh on 26th March and persisted till 27th March and has become less marked thereafter.

Western Disturbance (700 hpa & 500 hpa)

A western disturbance as trough in mid-tropospheric westerlies is seen roughly along longitude 70° E and north of latitude 30° N on 23rd March and seen as a feeble trough roughly along longitude 75° E and north of latitude 30° N on 24th March and moved away thereafter.

A trough in upper level westerlies is seen roughly along longitude 90° E and north of latitude 15° N on 25th March and moved away from the Indian region thereafter.

A fresh Western disturbance as a upper air cyclonic circulation is seen centered near longitude 44° E and latitude 34° N on 25th March and persisted over the same region till 26th March; seen as a trough roughly along longitude 50° E and north of latitude 30° N on 27th March and as a feeble trough roughly along longitude 58° E and north of latitude 34° N on 28th March.

3. IOP ADVISORY FOR 24 and 48Hrs:

Summary and Conclusions:

Day 1 & Day 2:

The Western Disturbance as an upper air cyclonic circulation over north Pakistan and adjoining Jammu & Kashmir extending upto 3.1 km above mean sea level persists with a trough aloft running roughly along longitude 70.0°E and north of latitude 30.0°N. Also, the induced upper air cyclonic circulation lies over Central Pakistan & adjoining West Rajasthan extending upto 1.5 Km above mean sea level persists. The above systems may result in rainfall/thunderstorm/hailstorm/squall activity over Jammu & Kashmir and adjoining Himachal Pradesh on day 1.

A trough runs from northeast Madhya Pradesh to Assam with an embedded upper air cyclonic circulation over northern parts of Bangladesh and adjoining Sub-Himalayan West Bengal and extends upto 0.9 km above mean sea level. This may result in thunderstorm/hailstorm/squall activity over Sikkim, Sub-Himalayan West Bengal and adjoining east Bihar on Day 1 & day 2 and south Assam, Nagaland, Manipur, Mizoram & Tripura on day 2. NCUM model of 00UTC today indicates very unstable atmosphere (Showalter Index value -3 to -4 and K-Index values >35) over most parts of northeastern states on day 2.

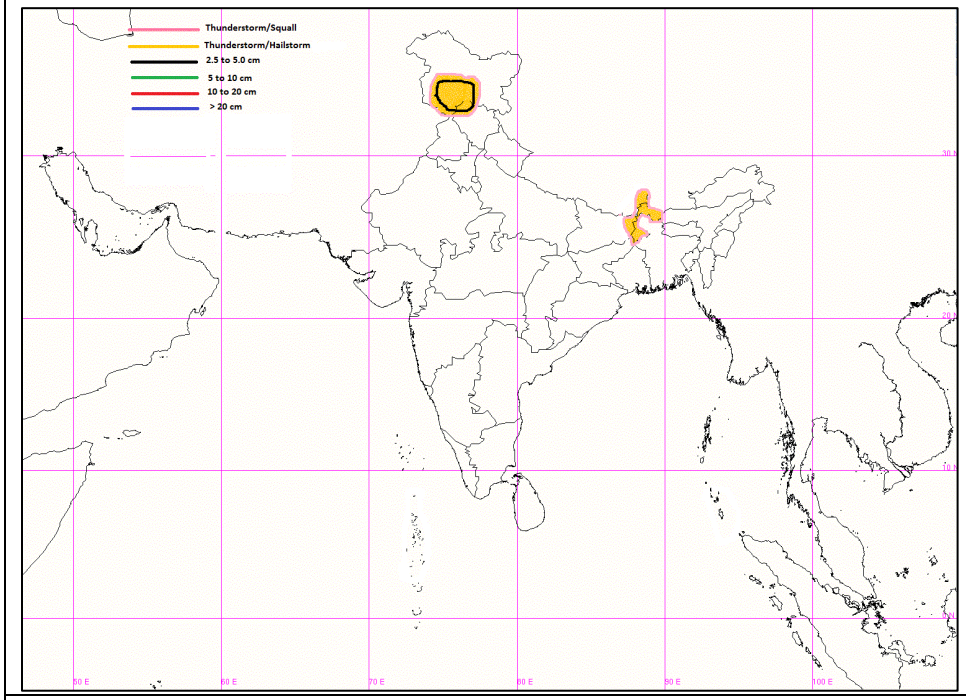
24 hour Advisory for IOP:

Jammu and Kashmir adjoining Himachal Pradesh
Sikkim, Sub-Himalayan West Bengal and adjoining east Bihar

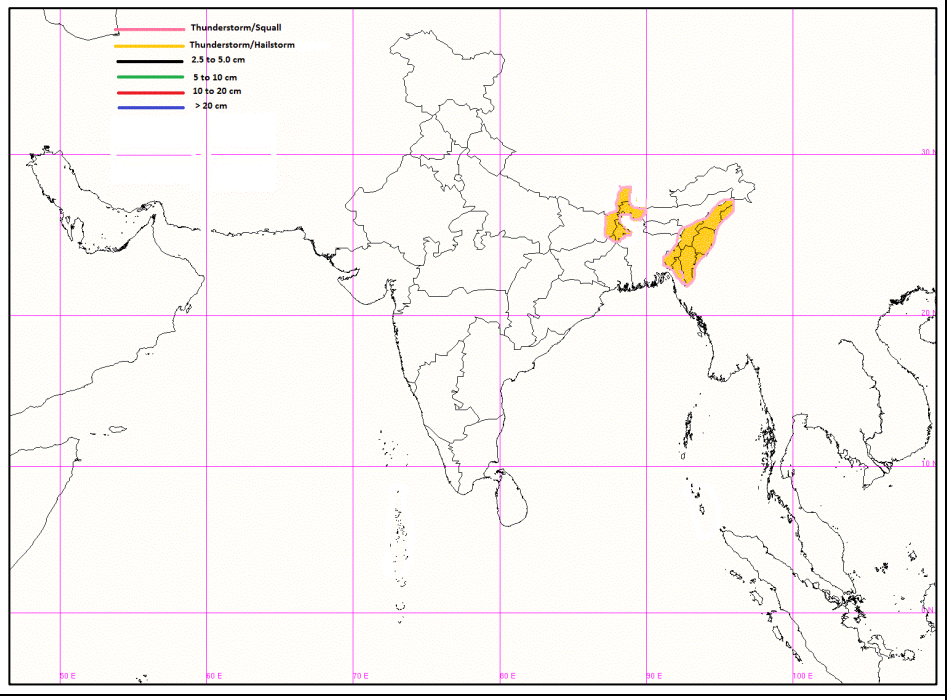
48 hour Advisory for IOP:

Sikkim, Sub-Himalayan West Bengal and adjoining east Bihar
South Assam, Nagaland, Manipur, Mizoram and Tripura.

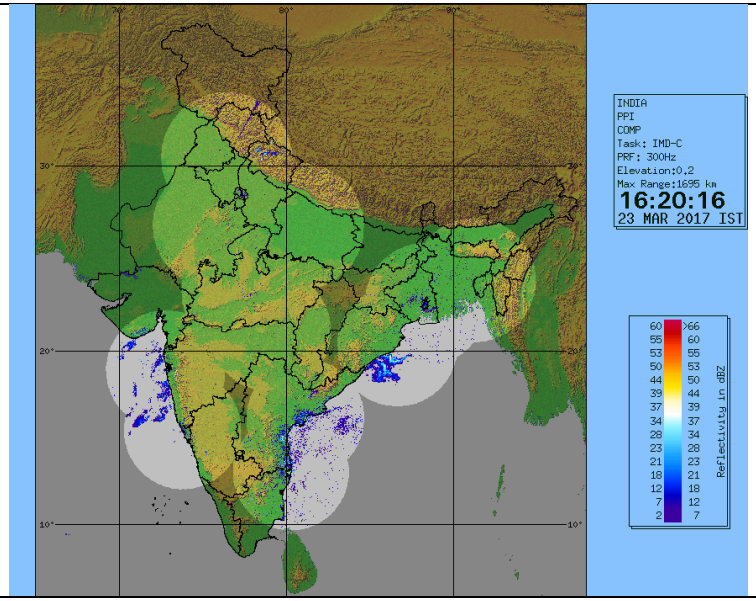
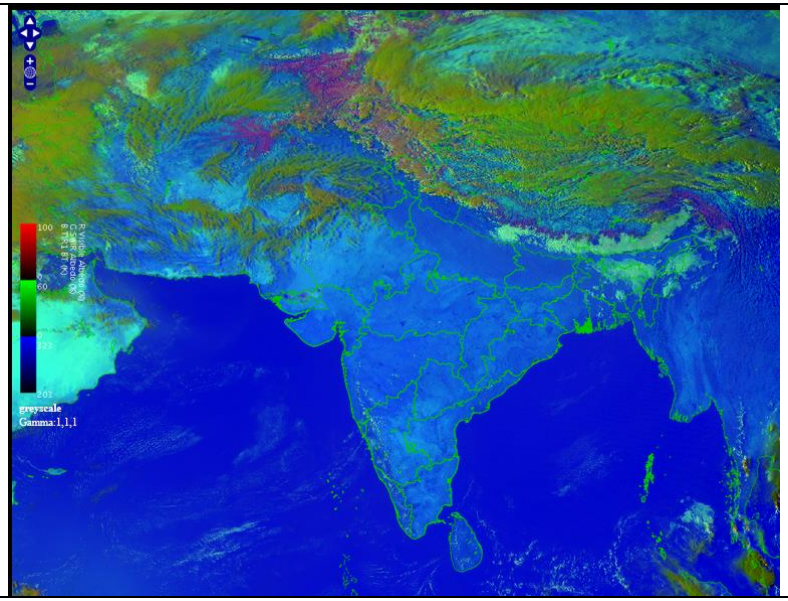
For NCMRWF NWP products:(http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php)
For IMD NWP products:(http://nwp.imd.gov.in/diagpro_new.php)
For Synoptic plotted data and charts
http://amssdelhi.gov.in/
http://www.amsskolkata.gov.in/
For RAPID tool:
http://rapid.imd.gov.in/
Low Level Winds
http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2017/?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
Past 24 hour HEM and IMR rainfall (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-Phi gram
http://satellite.imd.gov.in/map_skm2.html

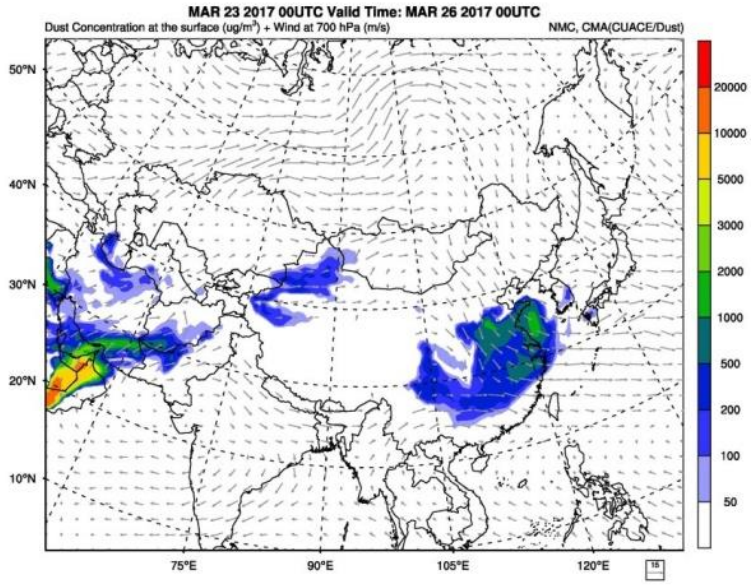


IOP Advisory for 24hours

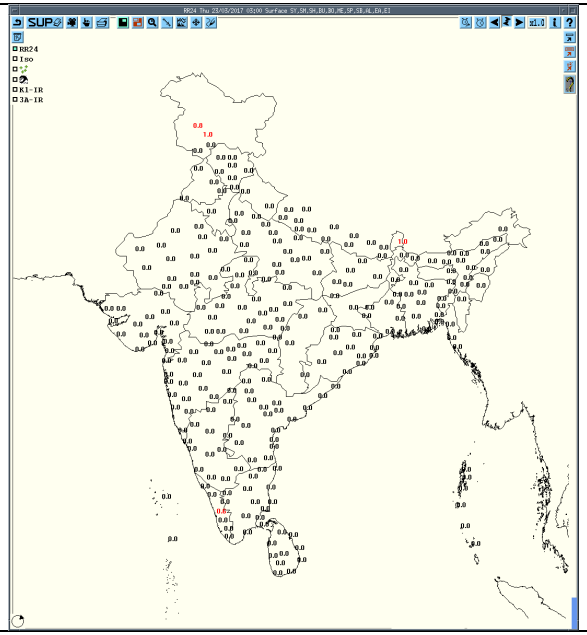


IOP Advisory for 48hours

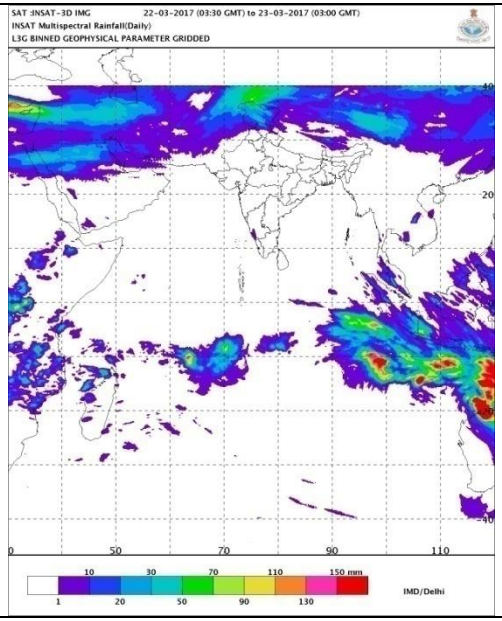
	
DWR Composite at 1620 hrs IST	**RGB Image of INSAT3D at 1600 hrs IST**



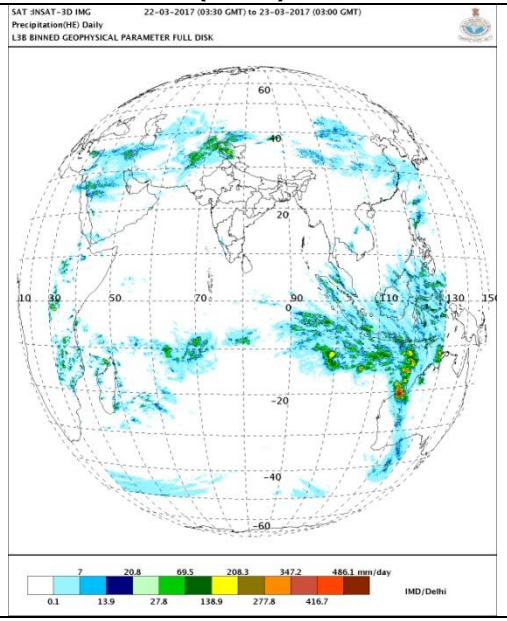
Forecast Dust Concentration at 00 UTC of 26 March



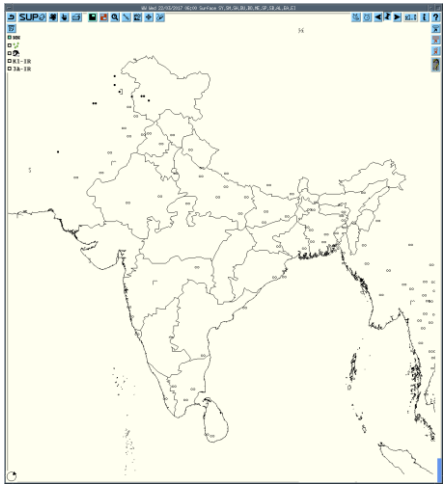
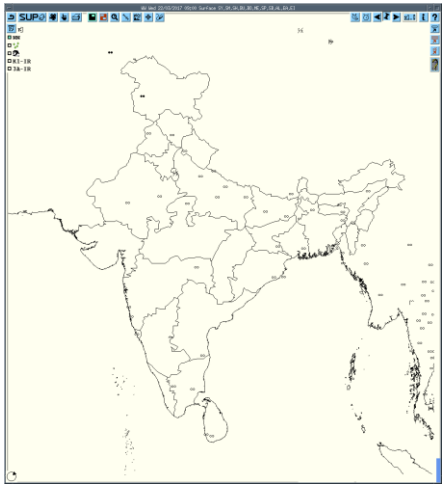
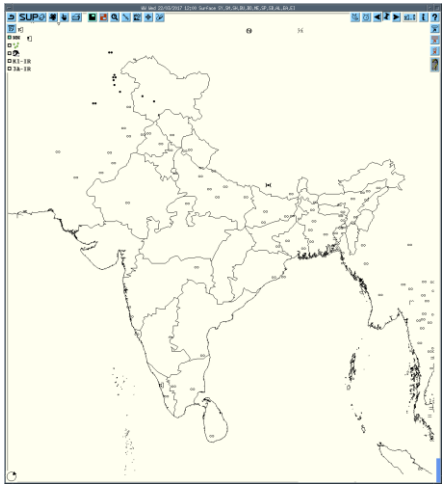
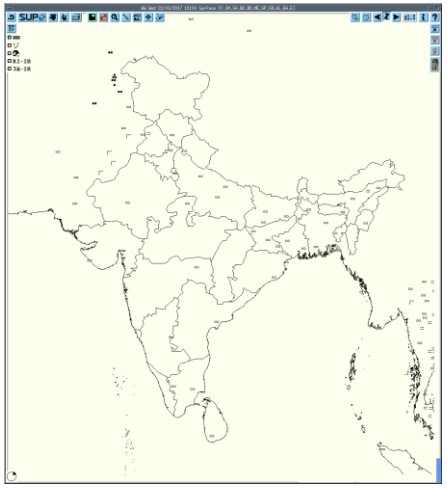
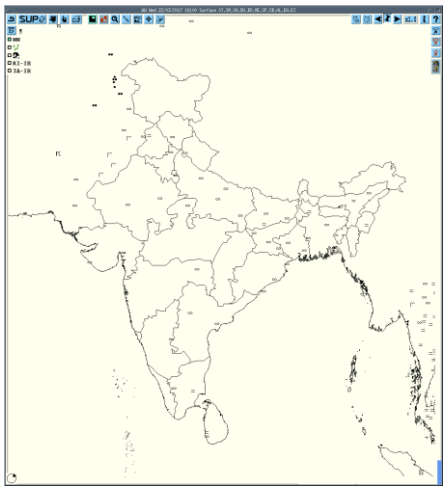
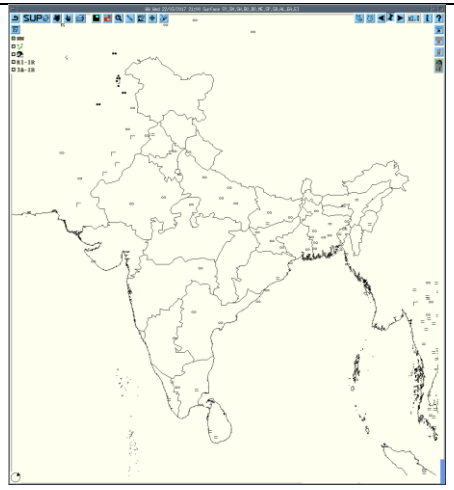
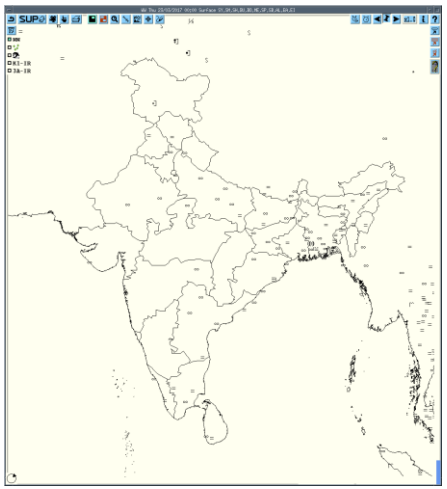
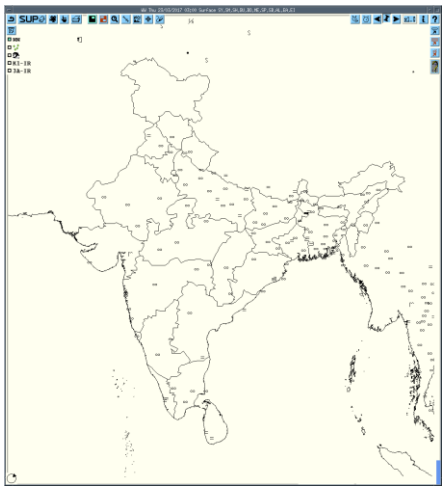
Accumulated 24 Hour rainfall (in red) recorded at 0300 UTC of today



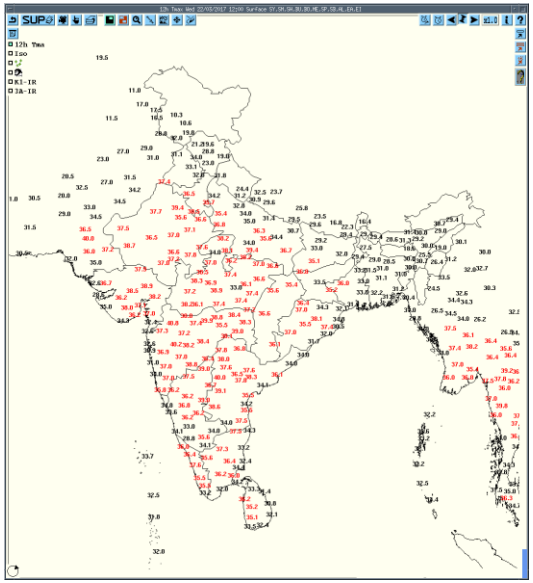
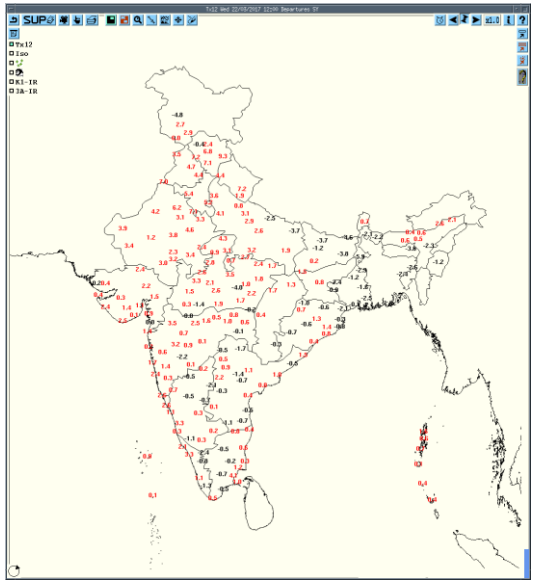
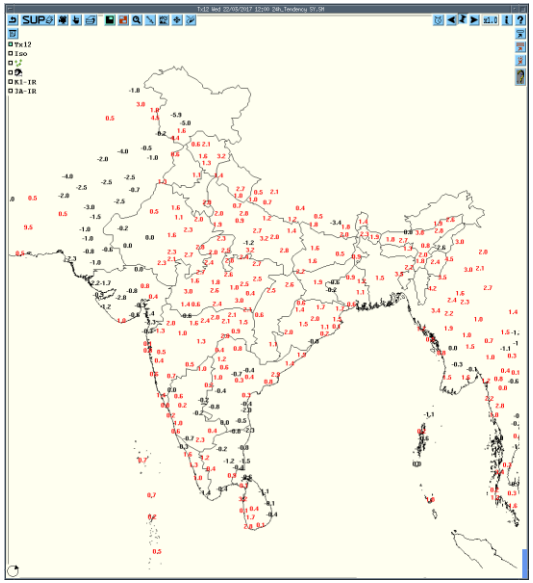
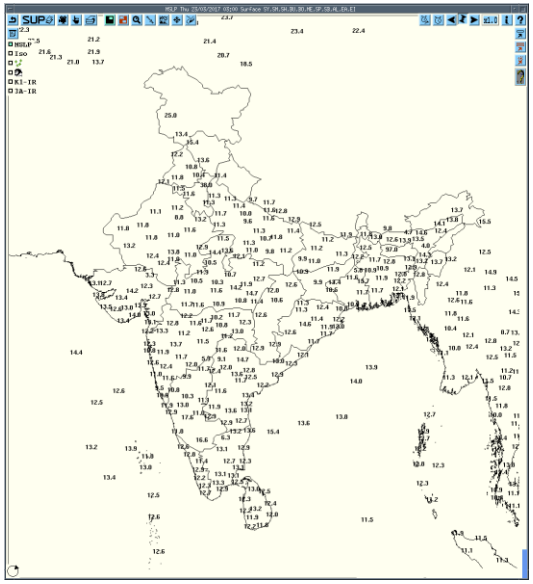
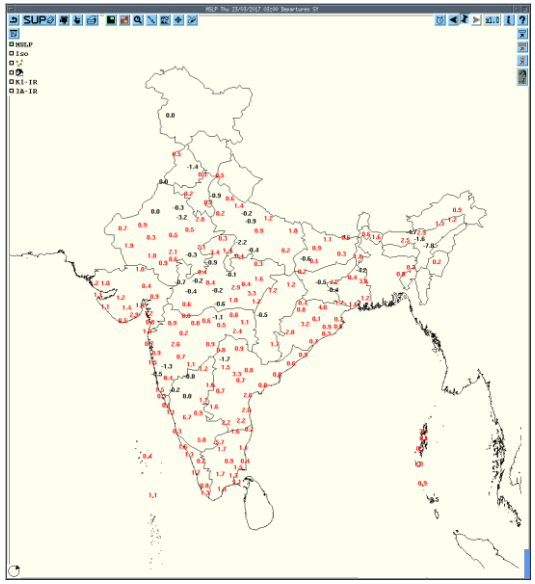
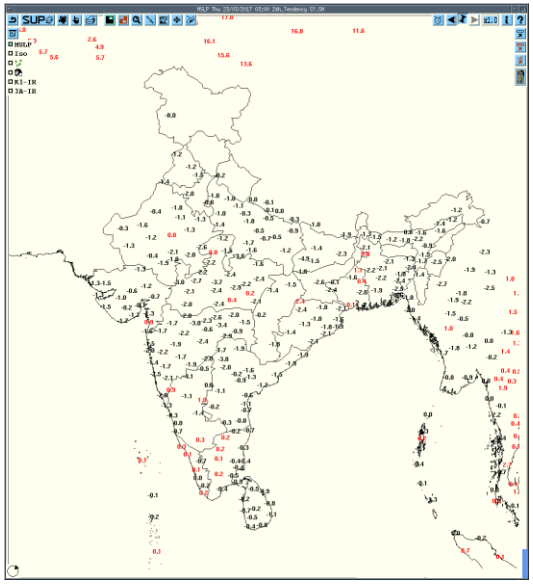
IMR Rainfall

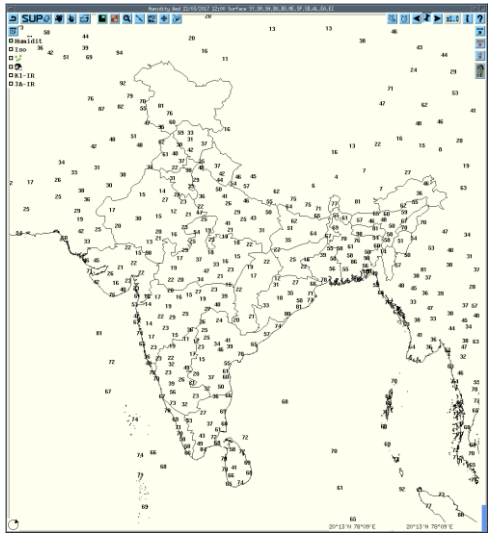
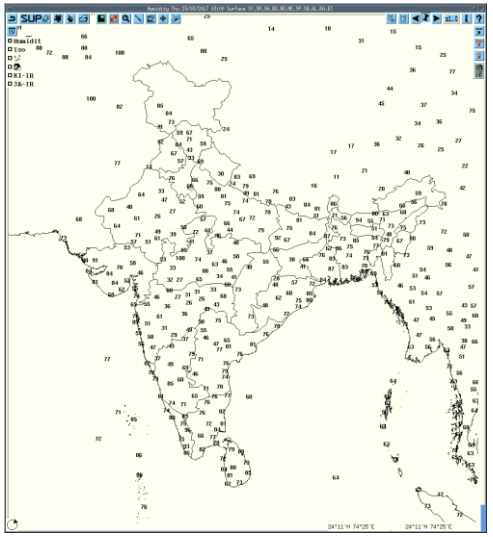


HEM Rainfall

3 hourly 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 12 UTC yesterday	**RH 03 UTC today**

Realized weather past 24 hours					
Date	**Time of Reporting**	**Name of Station Reporting**	**Region**	**STATE**	**Weather Event**
22-03-2017	0600 UTC	Nil	Nil	Nil	Nil
22-03-2017	0900 UTC	Nil	Nil	Nil	Nil
22-03-2017	1200 UTC	Karipur AP	South India	Kerala	Thunderstorm
22-03-2017	1500 UTC	Nil	Nil	Nil	Nil
22-03-2017	1800 UTC	Nil	Nil	Nil	Nil
22-03-2017	2100 UTC	Nil	Nil	Nil	Nil
23-03-2017	0000 UTC	Nil	Nil	Nil	Nil
23-03-2017	0300 UTC	Nil	Nil	Nil	Nil

Name of Station Reporting	Region	STATE	Weather Event	Date	Time of Commencement (IST)	Time of end (IST)
Alappuzha	South India	Kerala	Thunderstorm	22-03-17	1710	1745
Thiruvananthapuram City	South India	Kerala	Thunderstorm	22-03-17	1305	1355

Severe Weather warning based on DWR observation	
Name of issuing Radar station	**DWR LUCKNOW**
Geo-coordinates of issuing Station(Lat, Long,Alt)	---
Date and time of issue in UTC (yyyyMMddhhmm)	201703230600 UTC
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR KARAIKAL**
Geo-coordinates of issuing Station(Lat, Long,Alt)	Lat:10.91381N,Long:79.84141E/Alt:25masl
Date and time of issue in UTC (yyyyMMddhhmm)	---
Nature of severe weather expected	DWR U/S
Name of issuing Radar station	**DWR NAGPUR**
Geo-coordinates of issuing Station(Lat, Long,Alt)	Lat:21.1458°N,Long:79.0882°E
Date and time of issue in UTC (yyyyMMddhhmm)	---
Nature of severe weather expected	----
Name of issuing Radar station	**DWR MUMBAI**
Geo-coordinates of issuing Station(Lat, Long,Alt)	Lat–18˚54'04", Long-72˚48'32"/HeightAMSL–3.22meters.
Date and time of issue in UTC (yyyyMMddhhmm)	201703230700 UTC
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR AGARTALA**
Geo-coordinates of issuing Station(Lat, Long,Alt)	23.89°N,91.25°E,16mabovemsl
Date and time of issue in UTC (yyyyMMddhhmm)	201703230640 UTC
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR KOLKATA**
Geo-coordinates of issuing Station(Lat, Long,Alt)	22.5705° N / 88.353° E, 7m above msl
Date and time of issue in UTC (yyyyMMddhhmm)	201703230622 UTC
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR Machilipatnam**
Geo-coordinates of issuing Station(Lat, Long,Alt)	LAT: 16.12’ LONG: 81.09’ ALT: 3.05m.
Date and time of issue in UTC (yyyyMMddhhmm)	201703230601 UTC
Nature of severe weather expected	Nil

Past 24 hours DWR Report:

Radar Station name	Date	Time interval of observation (UTC)	Organization of the 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
NAGPUR	22/03/17	0232-0416	Nil	Nil	Radar U/S	Nil	Nil
		0416 -0552	Nil	206 km SW	Very small reflectivity of 17 dbZ	Nil	Nil
		0552-2352	Nil	Nil	No Echoes	Nil	Nil
	23/3/17	0002-0302 UTC	Nil	Nil	No Echoes	Nil	Nil