India Meteorological Department

FDP STORM Bulletin No.21(26-03-2017)

1. CURRENT SYNOPTIC SITUATION at 0300 UTC of 26-03-2017:

SYNOPTIC FEATURES:

The western disturbance as a trough in mid-tropospheric westerlies with its axis at 5.8 km above mean sea level roughly along longitude 45.0°E and north of latitude 22.0°N, now runs roughly along longitude 48.0°E to the north of latitude 25.0°N.
A trough runs from west Assam to south Chhattisgarh across Gangetic West Bengal, Jharkhand & interior Odisha and extends upto 0.9 km above mean sea level.
A trough runs from southeast Sri Lanka to south Tamilnadu across Comorin area and extends upto 0.9 km above mean sea level.
The upper air cyclonic circulation over North Interior Karnataka & neighbourhood persists and now extends upto 0.9 km above mean sea level.

SATELLITE OBSERVATIONS during past 24hrs and current observation:

Clouds (based on 0900UTC imagery of INSAT 3D):

Scattered multi/layered clouds were seen over Northwest J & K and area between Lat 37.0 N TO 45.0 N Long 61.0 E to 80.0 E in association with western disturbance over the area.
Scattered low/medium clouds over rest J & K, Himachal Pradesh North Uttarakhand, South Chhattisgarh, Odisha, Northeast Jharkhand, Bihar, Gangetic West Bengal, rest Northeast states, North coastal Andhra Pradesh, Telangana, Karnataka, Kerala, Konkan and Goa
Scattered low/medium clouds with embedded isolated weak to moderate convection seen over Sikkim, Sub Himalayan West Bengal, Arunachal Pradesh, Assam, Meghalaya and Nagaland.
Arabian Sea: No significant clouds over the region.
Bay of Bengal & Andaman Sea:
Scattered low/medium clouds with embedded isolated weak to moderate convection over central parts of South Bay and Andaman Sea.
Convection: Light to moderate convection was observed over J & K and North East parts of India.
OLR:- Upto 340 wm^{-2} was over central and south India; Upto 310 wm^{-2} was over Rajasthan, north Madhya Pradesh, South Uttar Pradesh and Bihar, Upto 280 wm^{-2} was over south Himachal Pradesh and Uttarakhand and Up to 230 wm^{-2} was over J&K. North Himachal Pradesh and NE states.
Jet Stream: No Jet stream was observed over India.
Dynamic Features: A positive Vorticity field is seen over J & K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Bihar, Sub-Himalayan West Bengal and south Konkan.
Moderate wind shear observed over North India and Low wind shear observed over South India.
Negative shear tendency observed over India.
Precipitation:
IMR: Rainfall upto 20mm was observed over North West Jammu Kashmir, Rainfall upto 10mm was observed over rest J&K, north-Gangetic West Bengal and NE states except Mizoram.

HEM: Rainfall up to 14mm was observed over North West Jammu Kashmir, north- Gangetic West Bengal and NE states except Mizoram.

RADAR and RAPID observation:

Isolated convective clouds were observed over Meghalaya in DWR Composite and RGB satellite imagery at 1630hrs 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 Day0-3 show feeble trough in MSLP over J & K; which is not seen at 00UTC
12UTC charts on all days from Day0-4 show Wind discontinuity at 925 hPa: Maharashtra, MP, Chhattisgarh and Odisha.
00UTC charts on Day-1-Day-3 show weak CYCIR over eastern UP and Bihar region at 925 and 850 hPa.
850hPa anticyclonic flow lies over Arabian Sea on all Days
2. Location of jet and jet core at 500hPa:-**500hPa Jet core (>60kt)**: Weak in magnitude on all Days. Well defined anticyclonic flow centred near Gujarat.
3. Convergence at 850 hPa: At 12UTC on all days: Strong low level convergence in land all along the west coast and isolated regions over Odisha. At 00UTC on all days: Northern part of Karnataka and Maharashtra
4. Low level Vorticity:-Positive Vorticity (>15 x 10^{-5}/s): at 12UTC on Day0and 1: Isolated locations along west coast, Odisha and along Himalayas on Day0-3 and over Assam and Arunachal on Day-4.
5. Showalter Index: -3 to -4[Very Unstable]: Day-0&1: Isolated location over coastal Maharashtra and Goa. Widespread over Bangladesh parts of Arunachal, Tripura and Manipur.
Day 2: Tripura and Manipur in NE and over J & K in north.
Day-3: over northern parts of UP and over Arunachal and parts of coastal Kerala and Karnataka
Day-4: parts of J & K, some parts of NE and over parts of coastal Kerala and Karnataka.
6. K-Index :> 35[Very Unstable thunderstorm likely]: Day-0 & 1: Isolated location over coastal Maharashtra and Goa. Widespread over Bangladesh parts of Arunachal, Tripura and Manipur.
Day2: Tripura and Manipuri in most parts of NE and over J & K, Bihar and WB.
Day-3: over northern parts of UP and over Arunachal and parts of coastal Kerala and Karnataka
Day-4: parts of J & K, most parts of NE India, WB.
7. Spatial distribution of TTI:
TTI >44 [Scattered Numerous Thunderstorms]: Isolated locations over Bangladesh, NE India and parts of J & K on all days.
Over Northern parts of UP and Uttarakhand on Day-3.
8. Rainfall and thunder storm activity: Day 3: (>4cm/day) J & K region, Meghalaya and Nagaland.
Day 4 and Day-5: (>4cm/day) widespread over NE India.

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

Weather Systems: CYCIR over GWB and adjoining Bay of Bengal with East-west trough over Bihar region is seen in the analysis charts. On day 2 the east-west trough over Bihar region is prominent and become a CYCIR, which persist during day 4 and day 5 along with NE-SW oriented trough parallel to the east coast.

The NE-west southwest oriented trough from GWB and passes through Odisha, south Chhattisgarh and adjoining regions is seen for next 4 to 5 days. Another quasi-stationary CYCIR with north-south trough is seen over interior Karnataka, Marathawada and adjoining areas during next 2/3 days.

2. Location of jet and jet core at 500 hPa:-500 hPa Jet core (>60kt): The Jet at 500 hPa almost does not exist over India during next 5 days except a small belt over UP and Bihar in the analysis as well as during next 2/3 days.

3. Low level Vorticity:-Positive Vorticity 850hPa (>12 x 10^{-1}/s): Mainly along foothill of Himalaya and over east UP, Bihar and Jharkhand and GWB, Odisha during next 2 to 3 days. The regions of eastern coastal states also witnessed vorticity maximum during day 3 to day 5. The significant vorticity zones associated with the cyclonic circulations are seen over Karnataka, Konkan-Goa and west coast during next 3 to days only in morning hours.

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): T-Storm Initiation Index (> 4): Significant zone with values exceeding 4 is noticed over north eastern coastal states including GWB, Odisha, Jharkhand and Bihar and adjoining Bangladesh during next 4/5 days. After two days the south-eastern coastal states also witnessed significant region with > 4. Some isolated regions of Karnataka coast and isolated region over Gujarat coast also indicated value > 4 during next 3 to 4 days.

Lifted Index (< -2): The areas with index less than -2 lies along east coast regions over GWB, Odisha, coastal AP, Bihar, Jharkhand and adjoining areas with gradually the LI areas with less than -2 mainly extended towards south-eastern coastal regions of India. Some isolated pockets over Karnataka and Goa coast also indicated LI with less than -2.

Sweat Index (> 400): Then significant zones are confined along east coast of India over Andhra coast, GWB, Odisha, Bangladesh and adjoining regions. Some parts of western Gujarat states and Karnataka coast also indicated the value > 400 K for next 3 days and over J & during next 5 days.

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

CAPE (> 1000): Mostly along east coast of India over Gangetic West Bengal, Odisha, Bihar, Jharkhand and adjoining regions during day next 5 days. The CAPE values also above threshold over Kerala and parts of coastal Karnataka, Konkan-Goa during day 3-5 days.

CINE (50-150): Maximum CINE values are found in some areas along east coast over GWB, Odisha, coastal AP and Tamil Nadu and also over Bihar and Jharkhand from Day-1 to Day-5.

5. Rainfall and thunderstorm activity: 10-40 mm rainfall over NE States and parts of south peninsula region on day 1. The rainfall over NE states likely to continue during subsequent 3 to 4 days.

J & K rainfall is likely during day 2 to 5 along with isolated rainfall over parts of extreme south Peninsula.

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

1. **Model reflectivity (Max. dBz)**: **(>25 dBz)** mainly over extreme NE states and also over J & K region after 16 UTC of today. dBZ exceeding the threshold value is also seen over J & K region during many hours on day 2 and day 3.

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 north-eastern states and J & K during morning hours.

K-Index (> 35): Less than threshold value over most parts of India during next 3 days but significant values are seen over some parts of NE states, Bihar and Jharkhand.
CAPE (> 1000): Mostly along east coast of India over Andhra Pradesh, Odisha, GWB, Bihar and Jharkhand during next 3 days. Another zone along west coast over Kerala, coastal Karnataka, Konkan & Goa.
CINE (50-150): CINE values are mostly small all over India during all three days of forecasts except some areas along coastal areas of India over Odisha, GWB, Bihar, Jharkhand, coastal AP, coastal Karnataka and Konkan-Goa during next 3 days.
5. Rainfall activity: - Rainfall activity (~ 10-40 mm) over NE states and south peninsula of day 1 and day 2 and day 3.
Rainfall activity: (~ 10-40 mm) over J & K also during day 1 to day 3.

3. IOP ADVISORY FOR 24 and 48Hrs:

Summary and Conclusions:

Day 1 & Day 2:
In association with the upper air trough from west Assam to Chhattisgarh across Gangetic West Bengal, Jharkhand & interior Odisha , moist wind incursion is taking place over north coastal Odisha, West Bengal and over Tripura. This may cause deep convection over the region with possibility of squalls. The low freezing levels over Sub-Himalayan West Bengal & Sikkim may cause the thunderstorm to produce hail also on day 1. On day-2, the Thunder squalls and hail bearing thunderstorms will form over region further to the east that is over Assam & Meghalaya and NMMT.

24 hour Advisory for IOP:
Coastal Odisha, West Bengal & Sikkim, East Bihar and Tripura

48 hour Advisory for IOP:
Assam, Meghalaya
Nagaland, Manipur, Mizoram and Tripura.

ForNCMRWFNWPproducts:(http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php)
ForIMDNWPproducts:(http://nwp.imd.gov.in/diagpro_new.php)
ForSynopticplotteddataandcharts
http://amssdelhi.gov.in/
http://www.amsskolkata.gov.in/
ForRAPIDtool:
http://rapid.imd.gov.in/
LowLevelWinds
http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2017/?C=M;O=D
Upperlevelwinds
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:
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Satellite sounder based T-Phi gram
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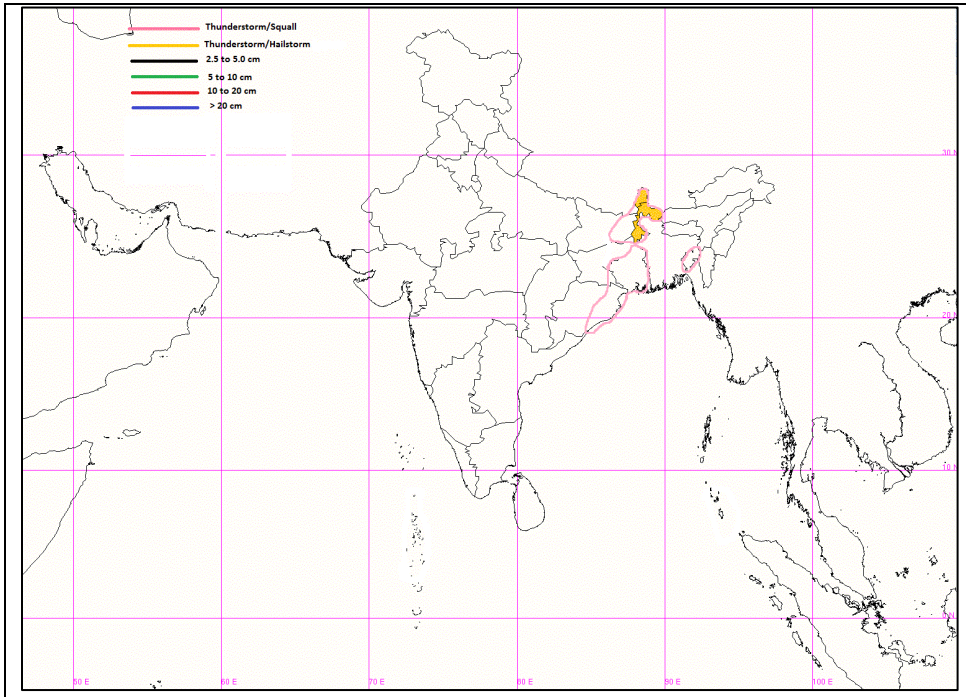
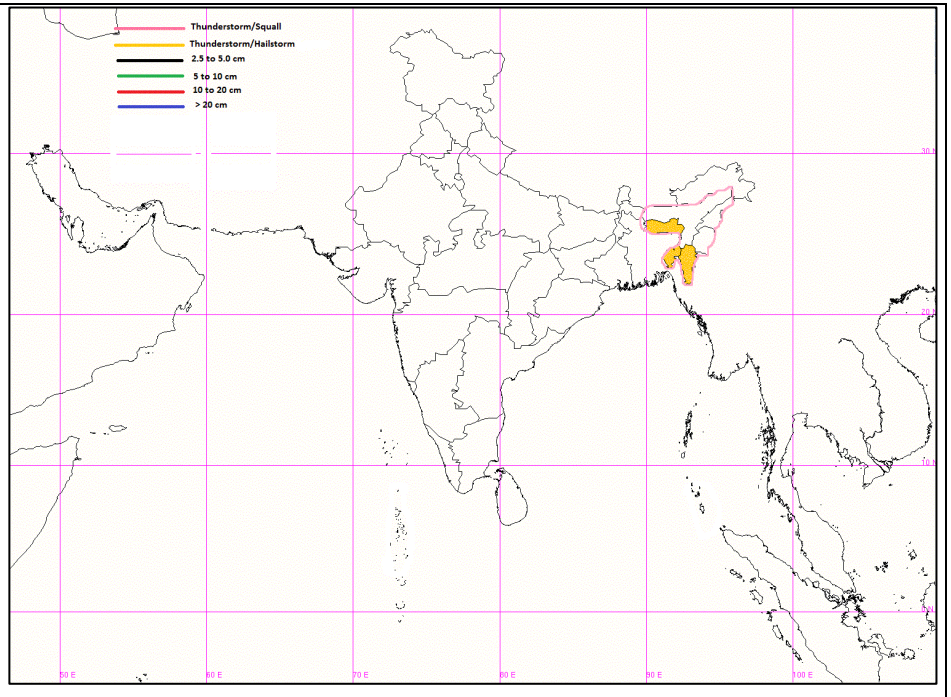
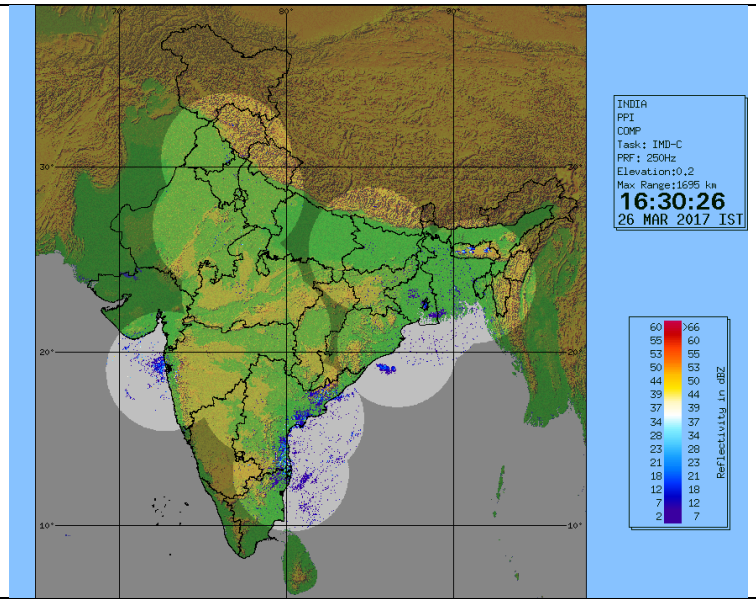


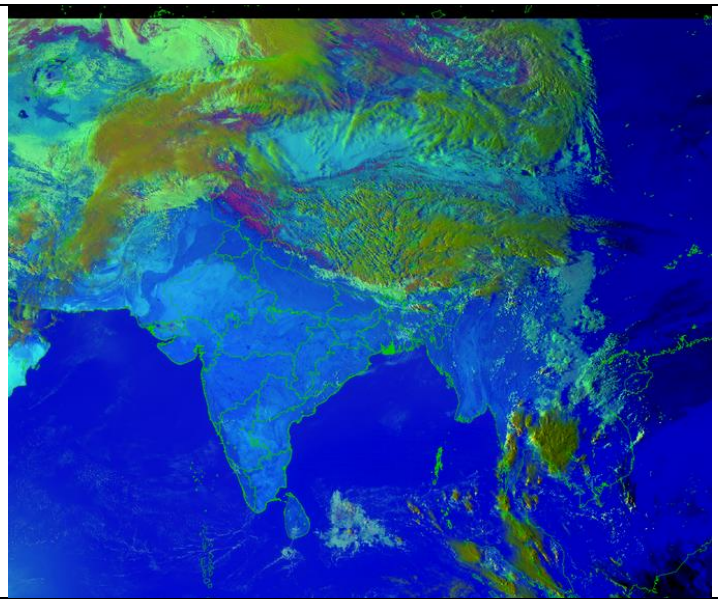
IOP Advisory for 24 hours



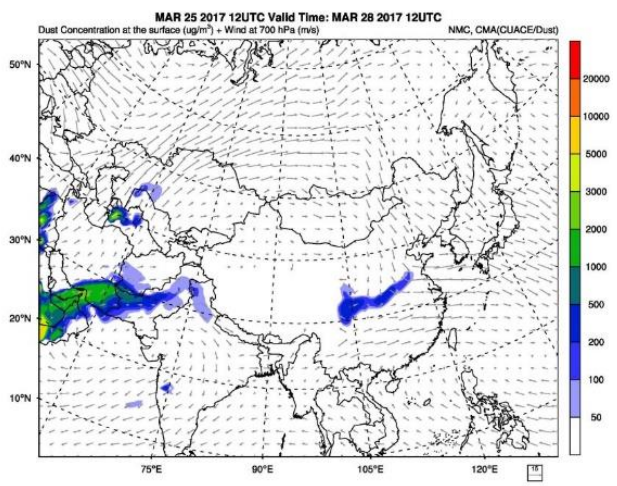
IOP Advisory for 48 hours



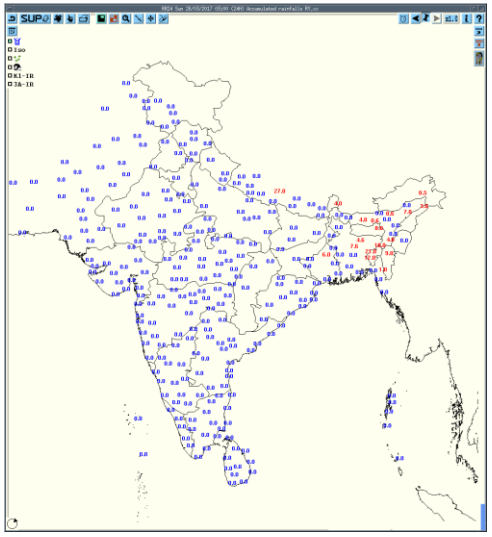
DWR Composite at 1630 hrs IST



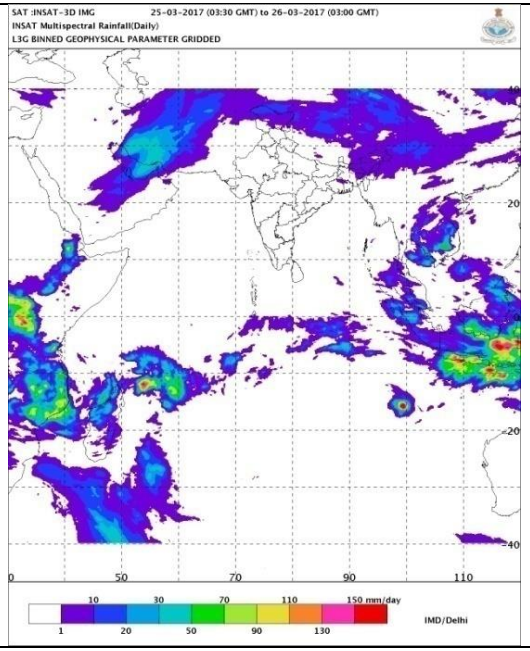
RGB Image of INSAT 3D at 1630 hrs IST



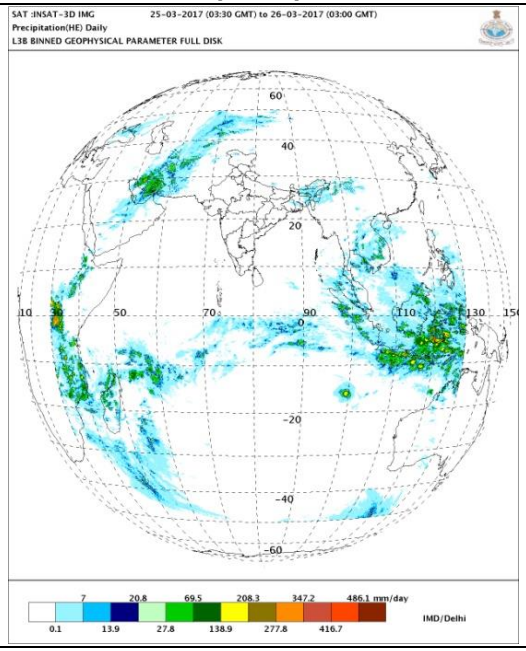
Forecast Dust Concentration at 12 UTC of 28 March



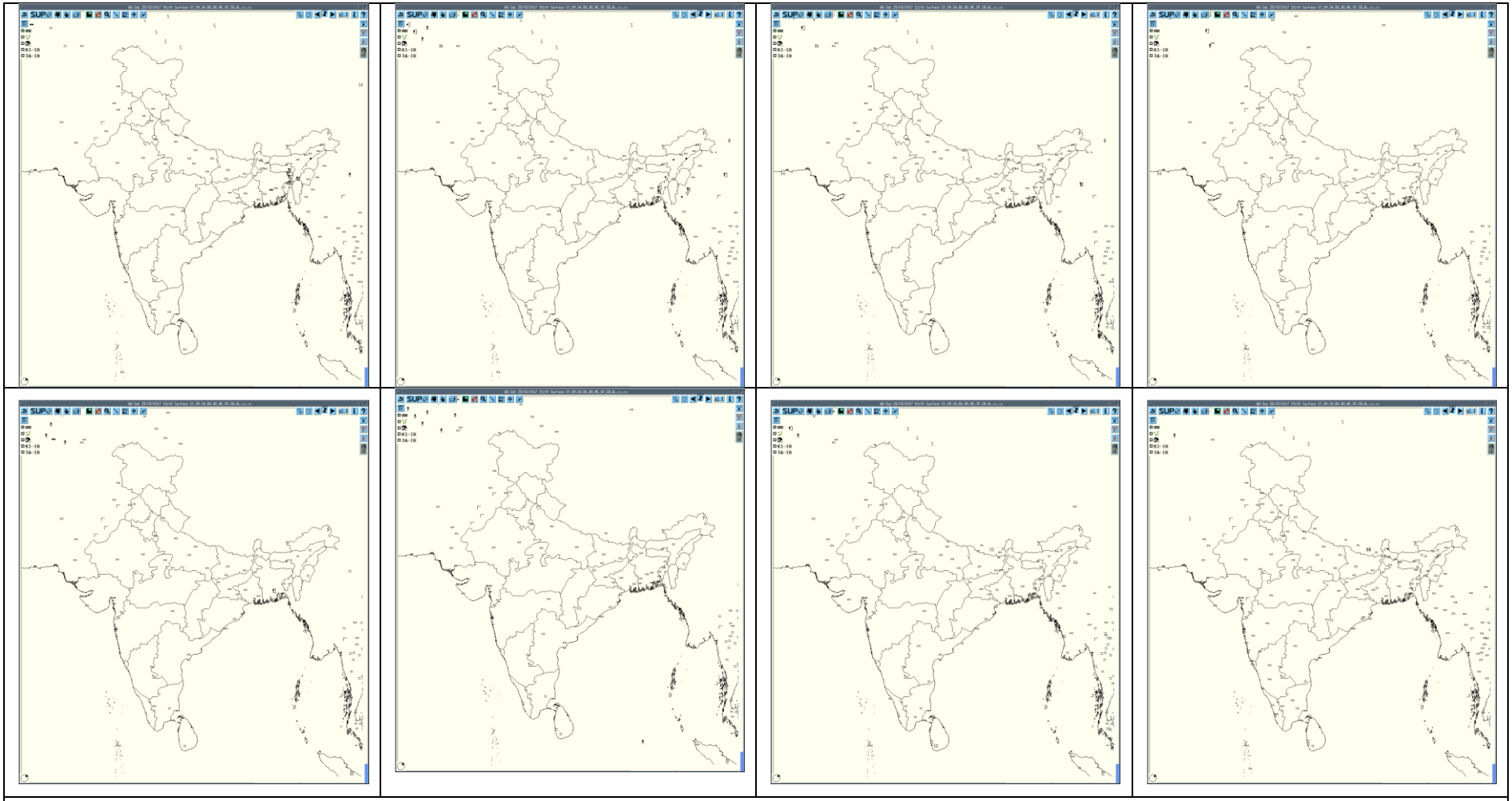
Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today



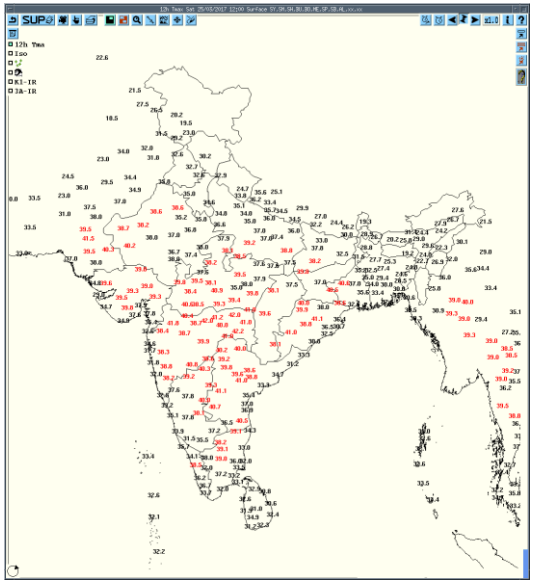
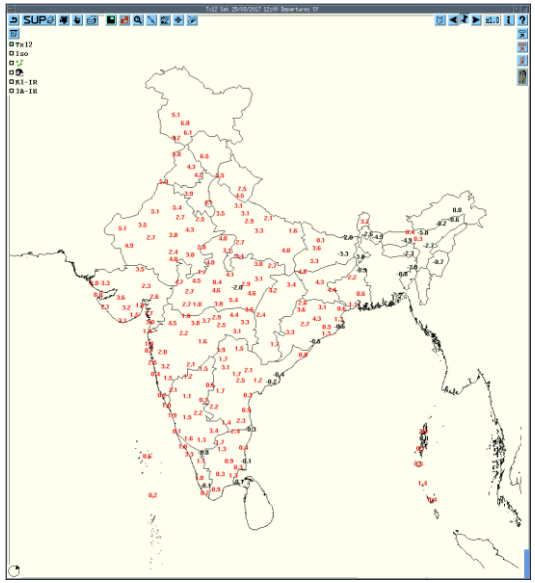
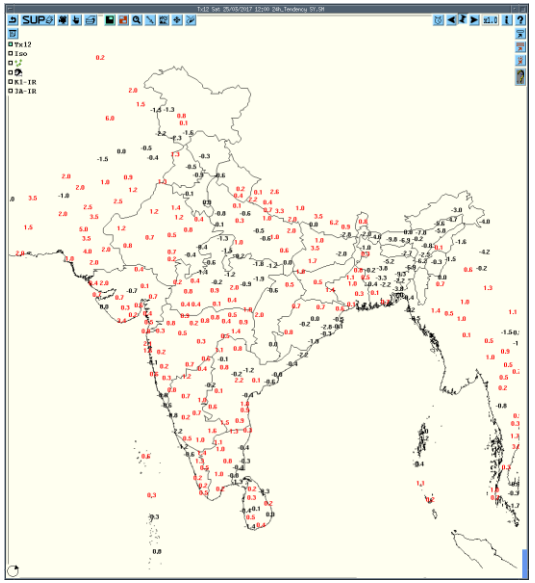
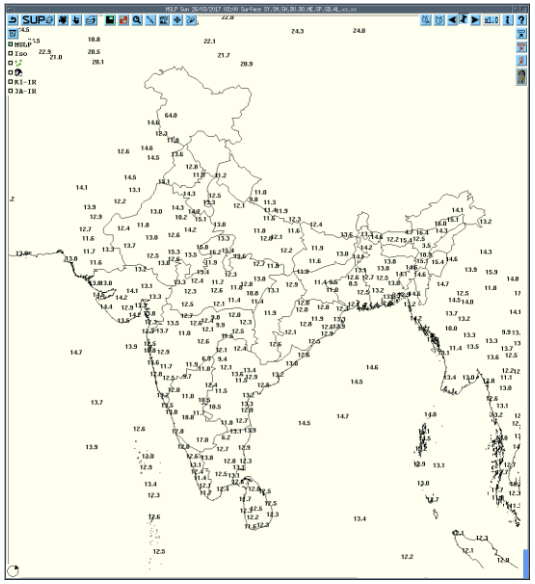
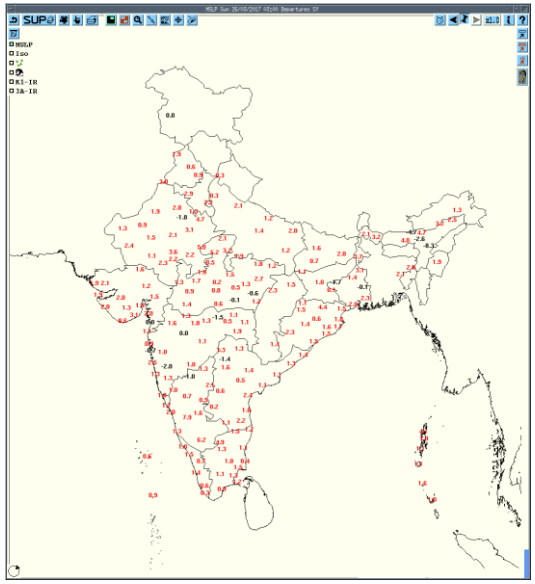
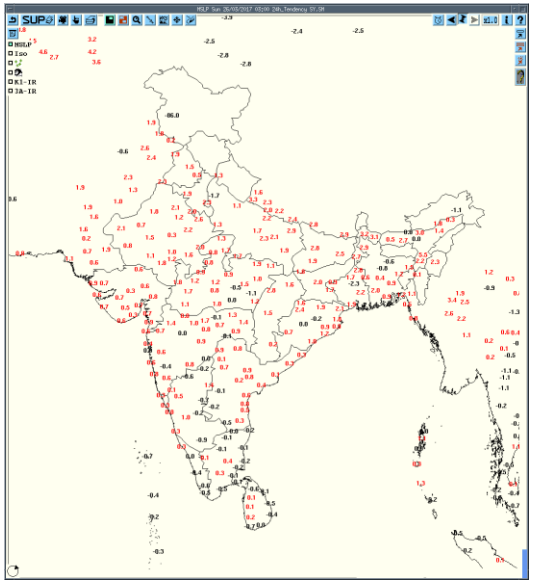
IMR Rainfall

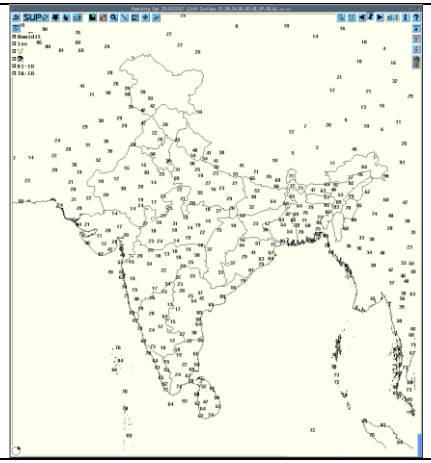
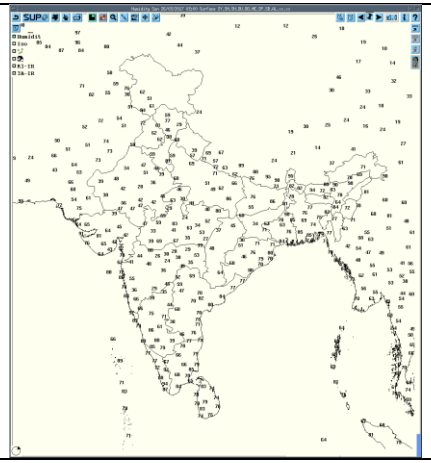


HEM Rainfall



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**

Realized weather past 24 hours (based on SYNERGIE data)					
Date	**Time of Reporting**	**Name of Station Reporting**	**Region**	**STATE**	**Weather Event**
25-03-2017	0600UTC	Shillong	Northeast India	Meghalaya	Thunderstorm
		Silchar	Northeast India	Assam	Thunderstorm
		Kailashsahar	Northeast India	Tripura	Thunderstorm
25-03-2017	0900UTC	Agartala	Northeast India	Tripura	Thunderstorm
25-03-2017	1200UTC	Burdwan	East India	West Bengal	Thunderstorm
25-03-2017	1500UTC	Nil	Nil	Nil	Nil
25-03-2017	1800UTC	Nil	Nil	Nil	Nil
25-03-2017	2100UTC	Nil	Nil	Nil	Nil
26-03-2017	0000UTC	Nil	Nil	Nil	Nil
26-03-2017	0300UTC	Nil	Nil	Nil	Nil

Name of Station Reporting	Region	STATE	Weather Event	Date	Time of Commencement (IST)	Time of end (IST)
Asansol	East India	West Bengal	TS	25-03-17	1720	1740
Jorhat	Northeast India	Assam	TSRA	25-03-17	25/0830	25/1000
Silchar	Northeast India	Assam	TSRA	25-03-17	25/1020	25/1230
Barapani	Northeast India	Meghalaya	TSRA	25-03-17	25/0950 25/1050	25/1000, 25/1110
Cherrapunjee	Northeast India	Meghalaya	TSRA	25-03-17	25/0852 25/1130	25/1130, 25/1230
Shillong	Northeast India	Meghalaya	TSRA	25-03-17	25/0930	25/1210
Imphal	Northeast India	Manipur	TSRA	25-03-17	25/1220	25/1245
Lengpui	Northeast India	Mizoram	TSRA	25-03-17	25/0530 25/1040	25/0905, 25/1135
Kailasahar	Northeast India	Tripura	TSRA	25-03-17	25/0930	25/1230
Agartala	Northeast India	Tripura	TSRA	25-03-17	25/0630 25/0915 25/1210	25/0650, 25/1120, 25/1350
Name of Station Reporting	Region	STATE	Weather Event	Date	Time of Commencement (IST)	Time of end (IST)
Asansol	East India	West Bengal	TS	25-03-17	1720	1740
Jorhat	Northeast India	Assam	TSRA	25-03-17	25/0830	25/1000
Silchar	Northeast India	Assam	TSRA	25-03-17	25/1020	25/1230
Barapani	Northeast India	Meghalaya	TSRA	25-03-17	25/0950 25/1050	25/1000, 25/1110
Cherrapunjee	Northeast India	Meghalaya	TSRA	25-03-17	25/0852 25/1130	25/1130, 25/1230
Shillong	Northeast India	Meghalaya	TSRA	25-03-17	25/0930	25/1210
Imphal	Northeast India	Manipur	TSRA	25-03-17	25/1220	25/1245
Lengpui	Northeast India	Mizoram	TSRA	25-03-17	25/0530 25/1040	25/0905, 25/1135
Kailasahar	Northeast India	Tripura	TSRA	25-03-17	25/0930	25/1230
Agartala	Northeast India	Tripura	TSRA	25-03-17	25/0630 25/0915 25/1210	25/0650, 25/1120, 25/1350

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)	---
Nature of severe weather expected	----
Name of issuing Radar station	**DWR PATNA**
Geo-coordinates of issuing Station(Lat, Long,Alt)	---
Date and time of issue in UTC (yyyyMMddhhmm)	-----
Nature of severe weather expected	-----
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)	201703260700
Nature of severe weather expected	DWR U/S
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)	----
Nature of severe weather expected	-----
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)	201703260610
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)	----
Nature of severe weather expected	-----
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)	201703260601
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR HJYDERABAD**
Geo-coordinates of issuing Station(Lat, Long,Alt)	17.2562^{o} N / 78.7656^{o} E
Date and time of issue in UTC (yyyyMMddhhmm)	201703260605
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
AGARTALA	26/03/17	250300 - 250700	Squall Line structure with average height 12 km and maximum reflectivity 54-58 dBZ	NW (450 KM) from DWR Agartala moving SE-wards at around 70 kmph	Multiple Cells at 2100 UTC of 24.03.17 later developing into a Squall Line at 0100 UTC of 25.03.17 with maximum reflectivity between 0250 to 0330 UTC died at 0700 UTC over Mizoram	Squall reported at Agartala Airport from 0336 UTC to 0338 UTC with maximum wind speed of 83 knots.	All Districts of Tripura, Northern parts of Mizoram
		250520 – 251030	Multiple Cells with average height of 9 km and maximum reflectivity 42-46 dBZ	WNW (130 KM) from DWR Agartala moving ESE-wards at around 60 kmph	Multiple Cells developing at 0520 UTC with maximum reflectivity between 0640 to 0730 UTC died at 1030 UTC over Mizoram	No Severe Weather (Thunder with light Rain reported at Agartala and Kailasahar observatories)	West Tripura , Sipahijala, Dhalai, Gomati districts of Tripura

Radar Station Name	Date	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
DWR KOLKATA	25-03-17	0301-0852	NIL	NIL	NO ECHO	NIL	NIL
	25-03-17	0852-1011	Isolated cells with Max height of 14.96 Km at 0931 UTC and maximum reflectivity of 63.5 dBz at 1011 UTC	NNW (216.2km) moving in SSE-ly direction at speed of 30.96 kmph	Cell started forming at 0852 UTC at NNW (261.2 Km) from radar. Matured and converted to multi celled system.	Thunderstorm/ Hailstorm	N/A
		1022-1111	Multi celled system with Max height of 16.39 Km at 1032 UTC and maximum reflectivity of 66.0 dBz at 1032 UTC	NNW (163.1km) moving in SE-ly direction at speed of 38.9 kmph	Above multi celled system formed at 1022 UTC at NNW (163.1 Km from radar and split into two cells.	Thunderstorm/ Hailstorm	N/A
		1121-1321	Split into two 1.with Max height of 8.07 Km at 1121 UTC and maximum reflectivity of 45.0 dBz at 1121 UTC 2.with Max height of 17.37 Km at 1231 UTC and maximum reflectivity of 60.5 dBz at 1231 UTC	1.NNW (127.8km) moving in SE-ly direction at speed of 30.2 kmph 2. N(163.2km) moving in ESE-ly direction at speed of 29.9 kmph	1. Died down at 1151 UTC 2. Regenerated to multi celled system from 1131 UTC and died down at 1321 UTC	1. Thunderstorm 2. Thunderstorm	N/A

Radar Station Name	Date	Time Interval Of Observation (UTC)	Organisation 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
PATNA	26/03/17	250300-260300	NIL	NIL	NIL	NIL	NIL
LUCKNOW	26/03/17	250300 - 260300	NIL	NIL	NIL	NIL	NIL
NAGPUR	26/03/17	250300 - 260300	NIL	NIL	NIL	NIL	NIL
PATIALA	26/03/17	250300 - 260300	NIL	NIL	NIL	NIL	NIL