India Meteorological Department

FDP STORM Bulletin No. 27 (01-04-2017)

1. CURRENT SYNOPTIC SITUATION at 0300 UTC of the Day:

SYNOPTIC FEATURES:

The Western Disturbance as an upper air cyclonic circulation over north Pakistan and neighbourhood extending upto 3.1 km above mean sea level persists and the trough in mid & upper tropospheric westerlies roughly along Longitude 64.0°E and north of Latitude 32.0°N now runs aloft this system roughly along Longitude 70.0°E and north of Latitude 32.0°N.
A trough runs from west Vidarbha to south Konkan across Marathawada & south Madhya Maharashtra and extends upto 0.9 km above mean sea level.
An upper air cyclonic circulation lies over Comorin area & neighbourhood at 1.5 km above mean sea level.
The upper air cyclonic circulation over south Pakistan and adjoining West Rajasthan persists and now seen between 1.5 & 2.1 km above mean sea level.
The upper air cyclonic circulation over north Interior Karnataka and adjoining Telangana has become less marked.
The Wind discontinuity from Comorin area to north interior Tamilnadu has become less marked.
The east west trough from Bihar to Manipur has become less marked. The upper air cyclonic circulation over north Bangladesh & neighbourhood persists and extends upto 2.1 km above mean sea level and a trough runs from this cyclonic circulation to south Odisha across Gangetic West Bengal and extends upto 1.5 km above mean sea level.
A fresh Western Disturbance likely to affect Western Himalayan region from 3rd and adjoining planes from 4th April onwards.

SATELLITE OBSERVATIONS during past 24hrs and current observation:

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

Convective Activity:

Cell No.	Date/Time (UTC)	Location & Area	CTBT (minus Deg. C)	Movement
1	11/0800	Meghalaya, Assam, Nagaland & Manipur	70	Developing
	11/0900	East Meghalaya, Assam, West Arunachal Pradesh	71	Expanding

Scattered multi-layered clouds were seen over J & K, Himachal Pradesh and north Uttarakhand in association with western disturbance over the area.
Scattered low/medium clouds with embedded moderate to intense convection were seen over extreme north Gangetic West Bengal, adjoining Sub-Himalayan west Bengal, Sikkim, Arunachal Pradesh, Assam, east Meghalaya, Nagaland, Manipur and west north Interior Karnataka (minimum CTT minus 55deg C). Scattered low/medium clouds with embedded isolated weak to moderate convection were seen over south Punjab, Haryana, northwest Uttar Pradesh, south Chhattisgarh, southwest Odisha, northwest Rajasthan and north coastal Andhra Pradesh. Scattered low/medium clouds were seen over Delhi, south Uttarakhand, south Madhya Pradesh, Maharashtra, north Chhattisgarh, rest Odisha, northeast Jharkhand, Bihar, rest West Bengal, rest north-eastern states, Telengana, rest Karnataka, Kerala, Tamilnadu and Bay Islands.

Arabian Sea:
Scattered low/medium clouds with embedded moderate to intense convection were seen over southeast Arabian Sea adjoining Indian Ocean.
Bay of Bengal & Andaman Sea:
Broken low/medium clouds with embedded moderate to intense convection were seen over south Andaman Sea and Tenasserim coast.
Convection:
Light to moderate convection was observed over J&K and North East parts of India.
OLR:- Up to 200 wm-2 was over J&K South Assam Manipur Up to 230 wm-2 was over North Himachal Pradesh, North Uttarakhand, East Meghalaya Sikkim Arunachal Pradesh East Assam Nagaland North Mizoram North Tripura. Up to 250 wm-2 was over Central Assam. Up to 270 wm-2 was over South Madhya Maharashtra.
Jet Stream:
No Jet stream and no trough observed over India.
Dynamic Features:
A positive Vorticity field is seen over Saurashtra South Maharashtra adjoining Karnataka, Uttarakhand, Uttar Pradesh, Bihar, West Bengal.
Low wind shear observed over south and moderate wind shear observed over North West India and weak to moderate wind shear observed over central India.
Positive shear tendency observed over the Andhra Pradesh and Negative shear tendency observed over rest India.
Positive Low Level Convergence observed over Central India.
Precipitation:
IMR: Rainfall upto 50mm was observed over J&K, extreme East Meghalaya, East and South Assam, East Arunachal Pradesh, Manipur, South Kerala and adjoining Tamilnadu.
Rainfall upto 10mm was observed over extreme North Himachal Pradesh, South Madhya Maharashtra, Sikkim, Central Assam, North Mizoram and North Tripura.
HEM: Rainfall upto 70mm was observed over West J&K, North East States, South Kerala and adjoining Tamilnadu. Rainfall upto 14mm was observed over South Madhya Maharashtra. Rainfall upto 7mm was observed over Central Assam Nagaland.

RADAR and RAPID observation:

Isolated significant convection was observed over Meghalaya adjoining south Assam, south Chhattisgarh adjoining Odisha, north Andhra Pradesh and North Interior Karnataka in DWR Composite at 1620hrs IST.
RAPID RGB Imagery of at 1530hrs IST also indicates convective cells over the same areas.

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

No significant dust concentration observed over Arabian Peninsula and west Rajasthan. Dust concentration is expected to increase over west Rajasthan 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 trough in MSLP over J & K extending NW-SE. Evolving heat low over NW of India and adjoining Pakistan from Day-2 onwards extending over IG plains
12UTC charts on all days from Day0-1 show wind discontinuity at 925 hPa: W-E; Maharashtra, Telangana and Odisha
12UTC charts on Day 4 show formation of a col region over Telangana. This is also evident at 850 hPa.
weak trough over Bihar & WB region at 925 and 850 hPa on Day-2 and 3
00 UTC: All day-A trough over Maharashtra, Karnataka extending upto Tamilnadu
850hPa anticyclonic flow lies over Oman is moving towards Arabian Sea in day 3 -4

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

Weak in magnitude on all Days. Jet core over Meghalaya in day 2
In Day-3 and Day-4 strong het core >60kt over Iran and Pakistan region. Approaching India with WD.

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. Day-2 and Day3: over parts of Assam/Meghalaya.

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

At 12UTC on all days over parts of Assam and Meghalaya. On Day 0, 1 & 2: Strong over northern UP & Bihar.
At 00UTC on all days along the line of low level confluence. Northern part of UP Day 0-3. Parts of Rajasthan on Day 4

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

Day-0: Isolated location over coastal Maharashtra, Goa, Kerala and J&K. and parts of NE over Meghalaya, Tripura and Arunachal.
Day-1: Isolated location over Goa, coastal Karnataka, Kerala parts of J&K and in NE over Meghalaya, Tripura and Arunachal.
Day-2: Goa, coastal Karnataka, Kerala, some parts of Telangana, coastal Odisha, North Bihar with J & K region and NE India
Day 3&4: Over Kerala, coastal Odisha, Bihar and NE India. Parts of J &K and over the IG plains

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

Day-0: Isolated location over coastal Maharashtra, Goa, Kerala and J&K. and parts of NE over Meghalaya, Tripura and Arunachal.
Day-1: Isolated location over Goa, coastal Karnataka, Kerala parts of J&K and in NE over Meghalaya, Tripura and Arunachal.
Day-2: Goa, coastal Karnataka, Kerala, some parts of Telangana, coastal Odisha, North Bihar with J & K region and NE India

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

Day 0-1: Along the coast of Maharashtra and Karnataka, J&K, Punjab. Day 1 also includes Bihar, adjoining east UP and Uttarakhand

8. Rainfall and thunder storm activity:

Day-0-4: (>4cm/day) over Most part of NE India
Day- 4&5 (>4cm/day) most parts of J&K and some parts of Himachal Pradesh

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

1. Weather Systems:

00 UTC analysis shows CYCIR over UP, Bihar, GWB and adjoining areas. The trough from this system extends to coastal Odisha through WB and is persisting till 4th day.

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

The Jet at 500 hPa does not exist over India during next 5 days.

3. Low level Vorticity:-Positive Vorticity 850hPa (>12 x 10^{-1}/s):
Analysis shows the low level positive vorticity mainly along foothill of Himalayas, over east UP, GWB and few pockets of Maharashtra, Karnataka and NE stats and is persisting till 4/5days.

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): Significant zones are noticed over GWB, Odisha, Jharkhand, Bihar, and eastern coast adjoining Bangladesh during next 4/5 days and coastal region of Gujarat also shows significant value from day 3 to day 4.

Lifted Index (< -2): The areas with index less than -2 lies along east coast regions, GWB, Odisha, coastal AP, Bihar and adjoining areas with gradually the LI areas with less than -2 mainly extended towards south-eastern coastal regions and west costal region of India.

Sweat Index (> 400): The significant zones are confined along east coast of India over Andhra coast, GWB, Odisha, Bangladesh and adjoining regions and very high value of SI observed over WB, Bihar, and east UP, Bangladesh and NE region for day 1 to day 4. Some parts of western Gujarat states and Karnataka coast along with few pockets in J & K also indicated the value > 400 K for next 5 days.

Total Total Index (> 50): Above threshold value in most parts of central India and adjoining northern parts of India from day 1 to day 4 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 and Kerala and parts of coastal Karnataka during next 5 days. The CAPE values above threshold values are also observed over Coastal Gujarat region from day 3.

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, Jharkhand and Goa & Konkan from Day-1 to Day-5 and Maximum CINE value over Gujarat region during next day 1 to day 5.

5. Rainfall and thunderstorm activity:
10-40 mm rainfall shows over isolated place of NE States, the rainfall over NE states likely to continue during subsequent 4 to 5 days and rainfall shows over J & K, Punjab and H.P from day 4 to day 5.

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

1. Model reflectivity (Max. dBz): **(>25 dBZ)**
Model reflectivity exceeding the threshold value, is seen over isolated pockets in north eastern states and J & K region in evening hours at day1 and day2 .

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

Total Total Index (> 50): Above threshold values is observed over most parts of India during next 3 days except parts of extreme south peninsular region, north-eastern states and J & K.

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

CAPE (> 1000): Mostly along east coast of India over Andhra Pradesh, Odisha, and GWB, Bihar and eastern UP during next 3 days. Another zone along west coast over Kerala, coastal Karnataka and Konkan & Goa during next 3 days.

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, Eastern UP, Bihar, Jharkhand, coastal AP, coastal Karnataka and Konkan-Goa during next 3 days.

3. Rainfall activity:
Rainfall activity (~ 10-40 mm) over NE states is expected to persist till next 3 days and rainfall observed over J & K on day 3.

3. IOP ADVISORY FOR 24 and 48Hrs:

Summary and Conclusions:

Day 1 & Day 2:

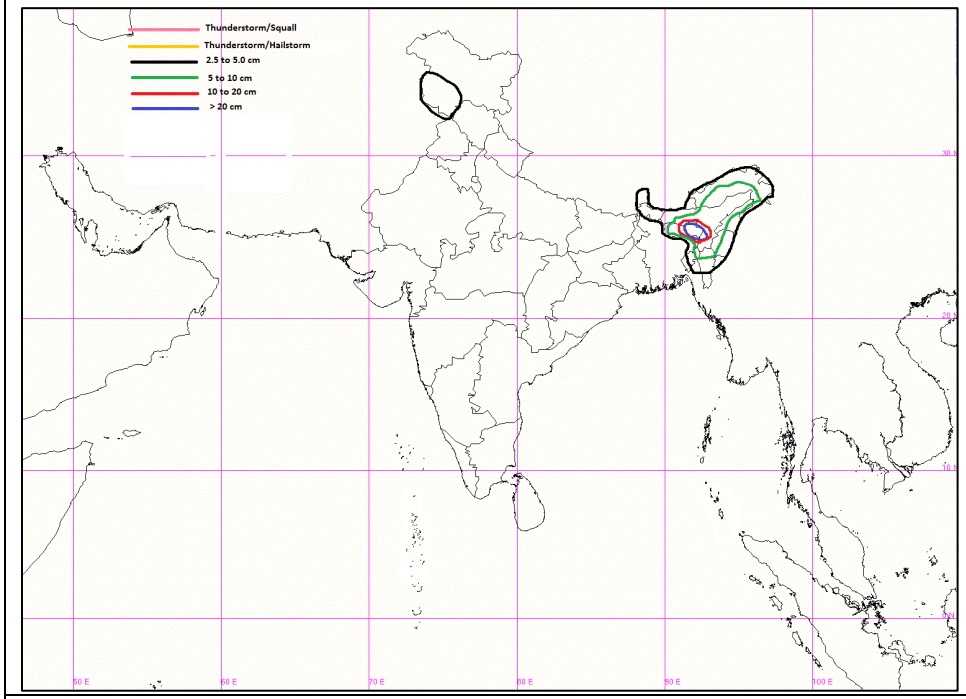
In association with the western disturbance over north Pakistan and neighbourhood, superposed with a trough in mid to upper level westerlies along longitude 70.0°E and north of latitude 32.0°N, rainfall is expected over West Jammu and Kashmir on day 1. Rainfall is likely to decrease over the region on day 2.

The east-west trough seen yesterday from Bihar to Manipur across Bangladesh has become less marked. However, the embedded upper air cyclonic circulation over Bangladesh and adjoining northern parts of West Bengal, has intensified and now extends upto 2.1 km above mean sea level with a trough extending from it to south Odisha. The region of wind convergence over Tripura and adjoining South Assam upto 850 hPa also persists. The persistent moisture supply in the lower levels over North-east India over the last 3-4 days, coupled with the direction of the wind flow in the lower levels, is likely to result in extremely heavy rainfall over Meghalaya and heavy rainfall over Assam, Nagaland, Manipur and Arunachal Pradesh on day 1. The systems are likely to persist tomorrow. As a result, very heavy rainfall is also expected to occur over Arunachal Pradesh, Meghalaya and South Assam on day 2.
The guidance from the NWP model output from ECMWF, IMD1534 and NCEP IITM GFS, NEPS and Satellite imageries are also suggesting the similar area of rainfall activity on Day1 and Day2.

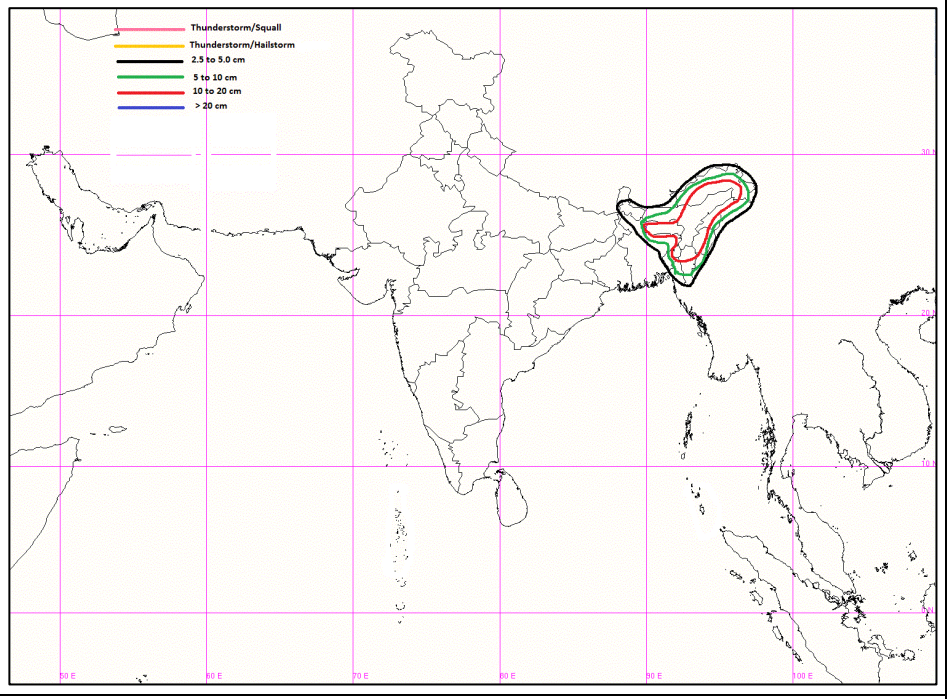
24 hour Advisory for IOP:
Meghalaya
Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram and Tripura
West Jammu and Kashmir.

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

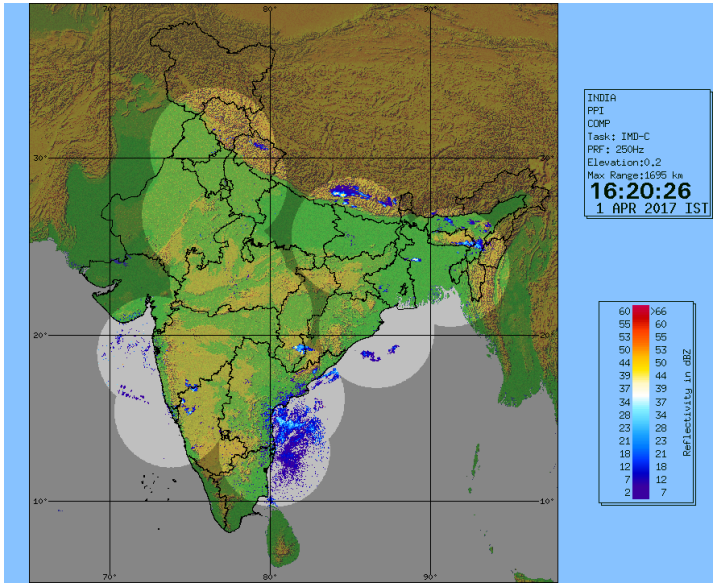
ForNCMRWFNWPproducts:(http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php)
ForIMDNWPproducts:(http://nwp.imd.gov.in/diagpro_new.php)
ForSynopticplotteddataandcharts
http://amssdelhi.gov.in/
http://www.amsskolkata.gov.in/
ForRAPIDtool:
http://rapid.imd.gov.in/
LowLevelWinds
http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2017/?C=M;O=D
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:
http://ddgmui.imd.gov.in/dwr_img/
Satellite sounder based T-Phi gram
http://satellite.imd.gov.in/map_skm2.html



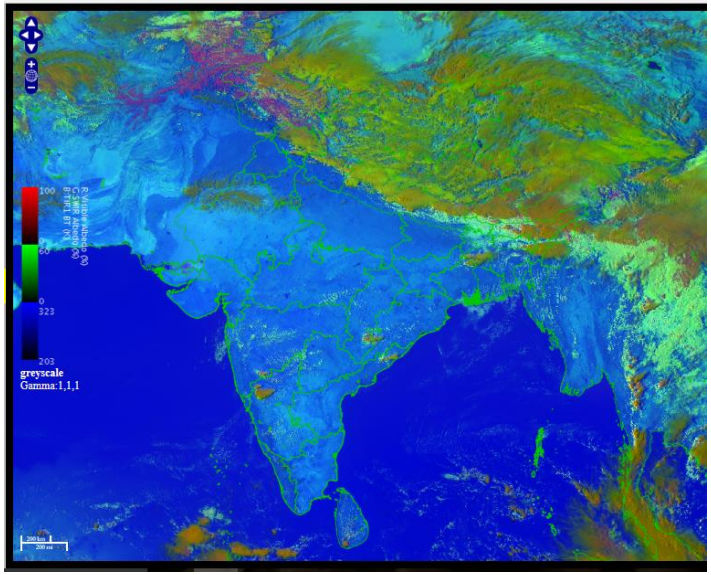
IOP Advisory for 24 hours



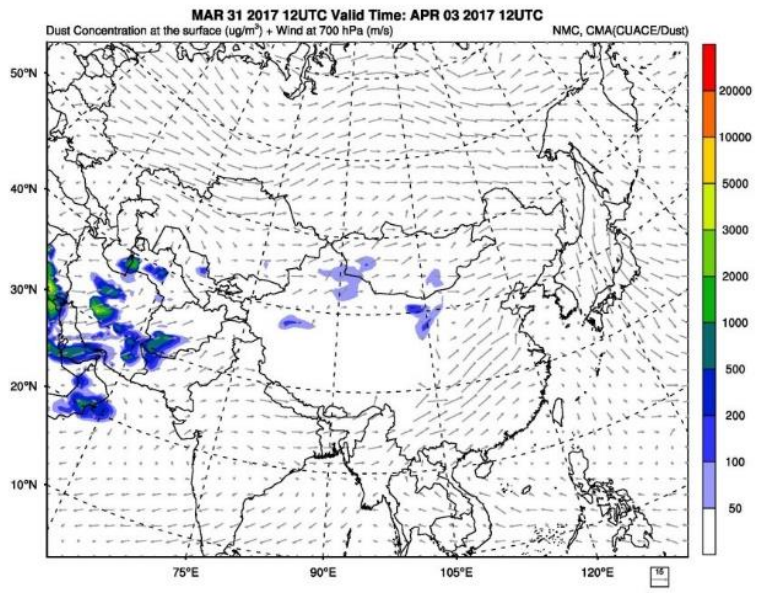
IOP Advisory for 48 hours



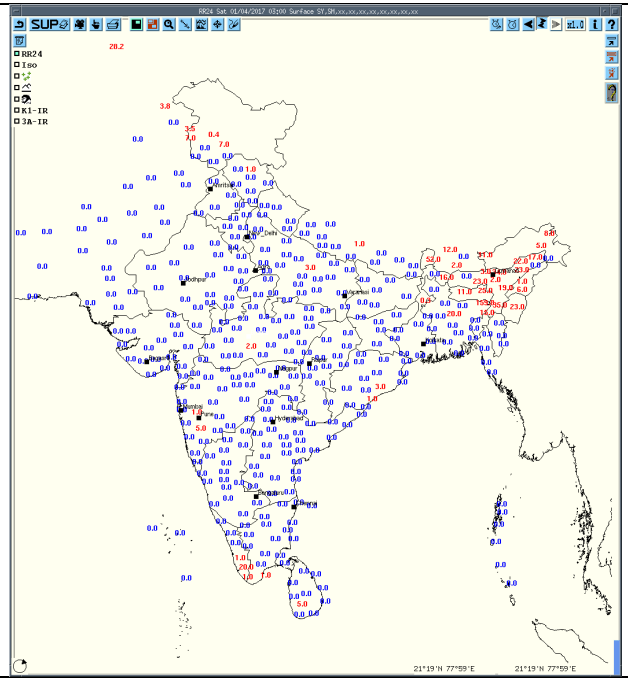
DWR Composite at 1620 hrs IST



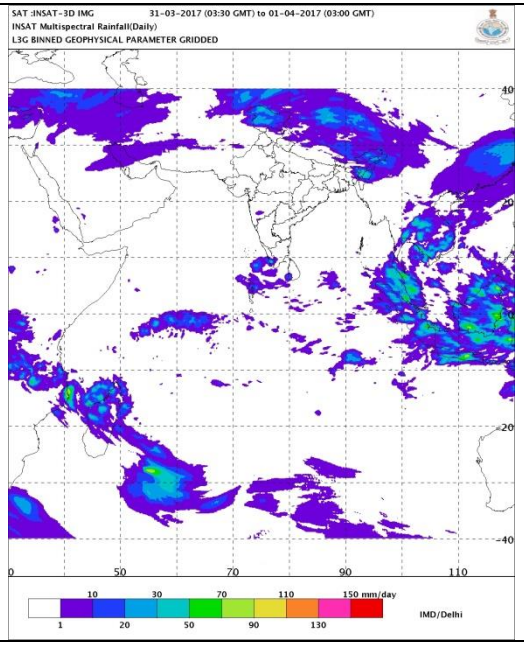
RAPID RGB Image of INSAT 3D at 1530 hrs IST



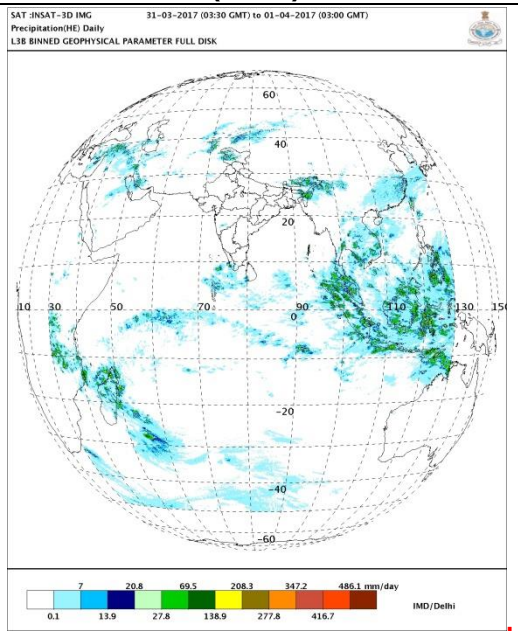
Forecast Dust Concentration at 12 UTC of 03 April



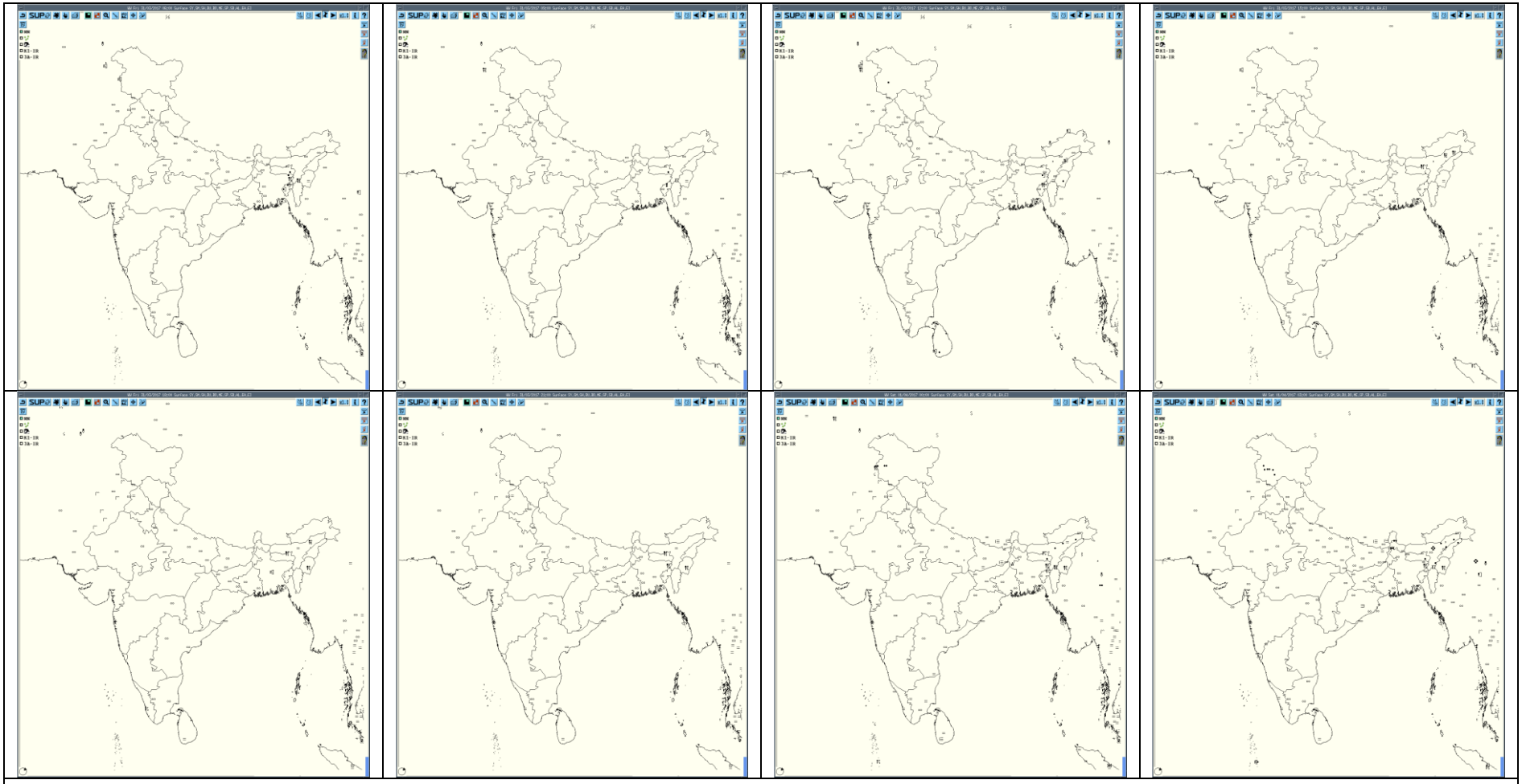
Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today



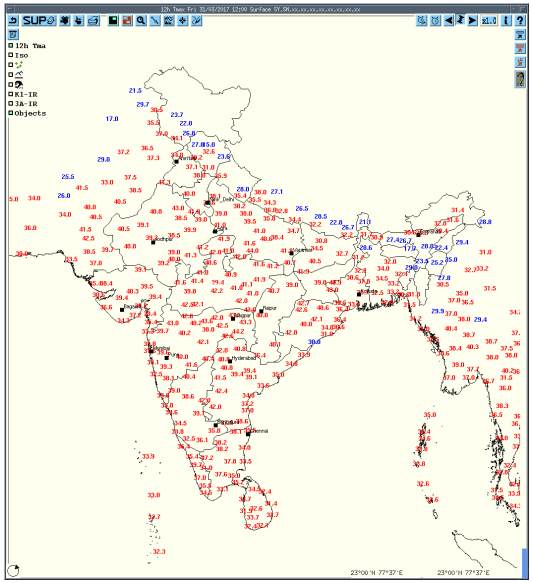
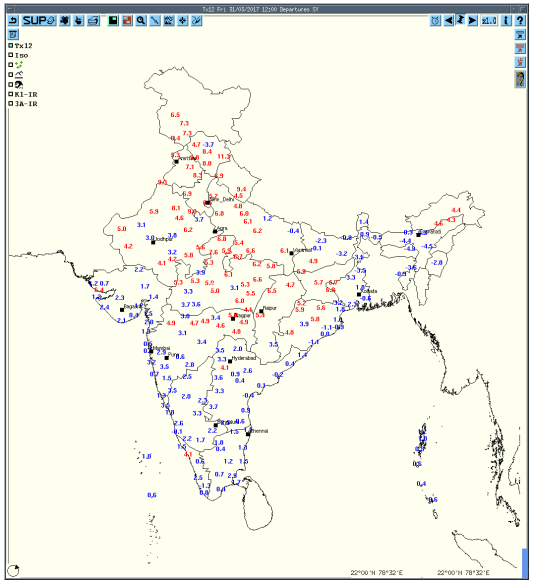
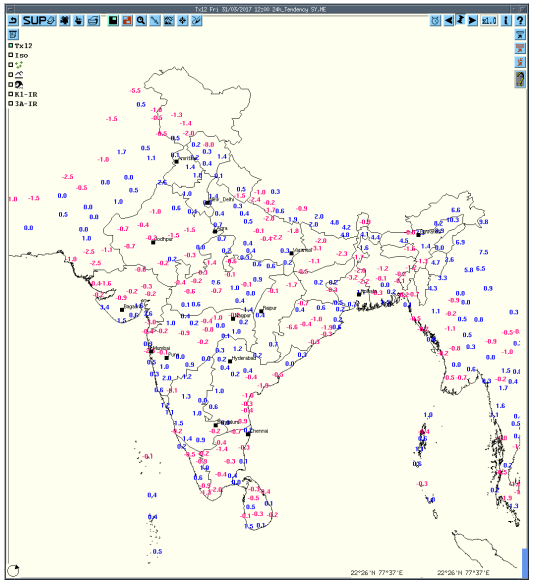
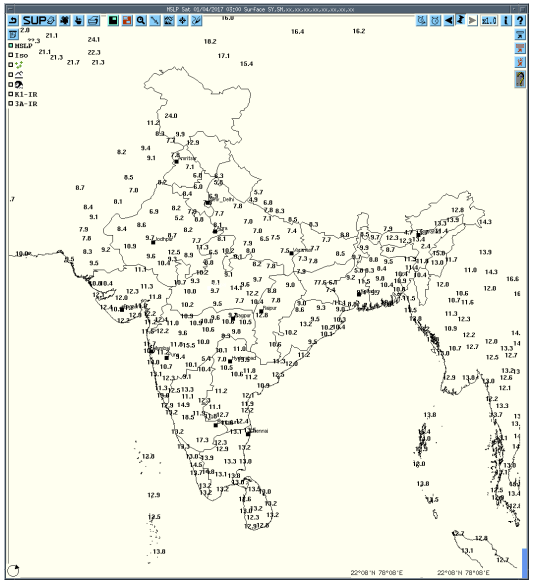
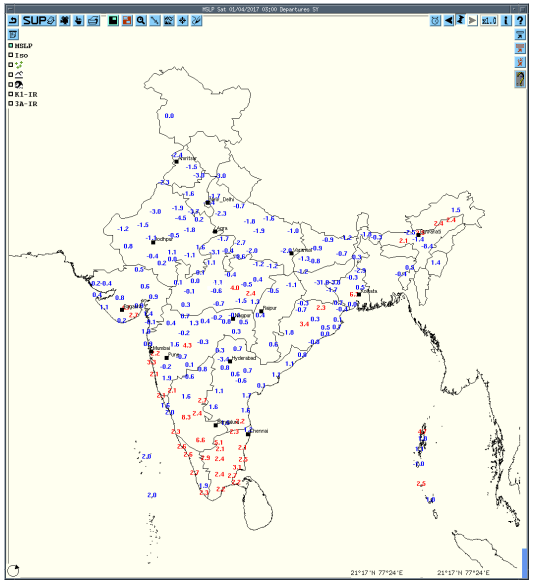
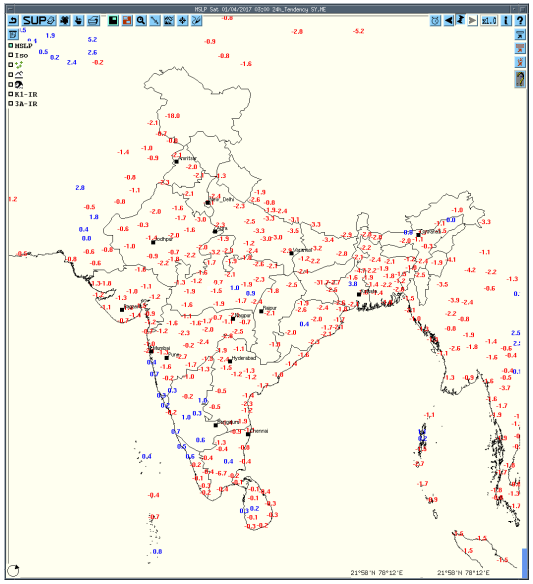
IMR Rainfall

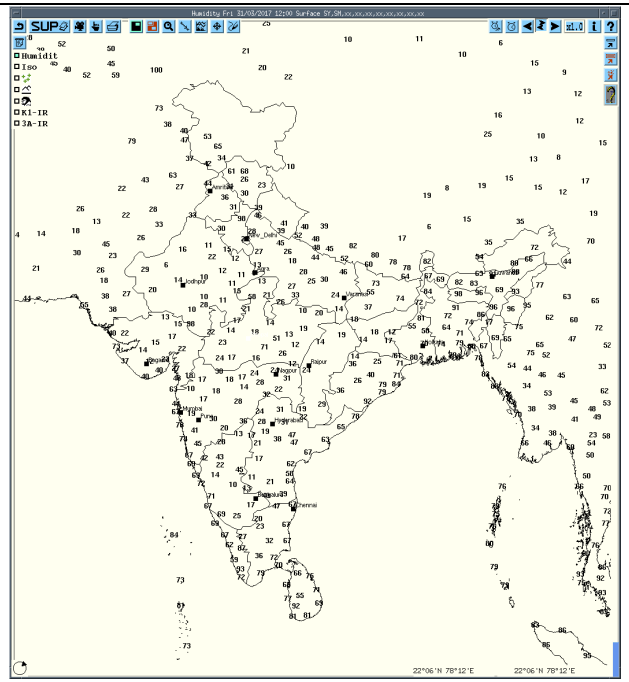
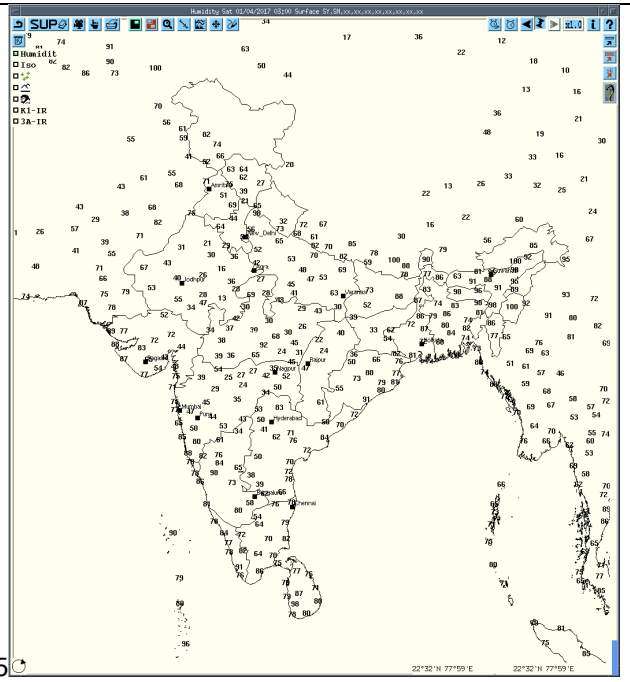


HEM Rainfall



3hourly Past weather at 06, 09, 12, 15, 18, 21UTC 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**
31-03-2017	0600UTC	Silchar	Northeast India	Assam	Thunderstorm
31-03-2017	0900UTC	Silchar	Northeast India	Assam	Thunderstorm
		Thiruvananthapuram	South India	Kerala	Thunderstorm
31-03-2017	1200UTC	Punalar	South India	Kerala	Thunderstorm
		Banihal	Northwest India	J & K	Thunderstorm
		Jorhat	Northeast India	Assam	Thunderstorm
31-03-2017	1500UTC	Guwahati	Northeast India	Assam	Thunderstorm
		North Lakhimpur	Northeast India	Assam	Thunderstorm
		Dibrugarh	Northeast India	Assam	Thunderstorm
31-03-2017	1800UTC	Cochin	South India	Kerala	Thunderstorm
		Guwahati	Northeast India	Assam	Thunderstorm
		North Lakhimpur	Northeast India	Assam	Thunderstorm
		Imphal	Northeast India	Manipur	Thunderstorm
		Agartala	Northeast India	Tripura	Lightening
31-03-2017	2100UTC	Guwahati	Northeast India	Assam	Thunderstorm
		Imphal	Northeast India	Manipur	Thunderstorm
01-04-2017	0000UTC	Guwahati	Northeast India	Assam	Thunderstorm
		Silchar	Northeast India	Assam	Thunderstorm
		Kailasahar	Northeast India	Tripura	Thunderstorm
		Imphal	Northeast India	Manipur	Thunderstorm
01-04-2017	0300UTC	Silchar	Northeast India	Assam	Thunderstorm
		Imphal	Northeast India	Manipur	Thunderstorm

Realized TS/HS/SQ during past 24 hours ending at 0300UTC of today (received from RMCs/MCs)						
Name of Station Reporting	**Region**	**STATE**	**Weather Event (TS/Hail/Squall)**	**Date**	**Time of Commencement (IST)**	**Time of end (IST)**
Srinagar	Northwest India	J & K	Thunderstorm	01-04-17	0630	0640
Qazigund	Northwest India	J & K	Thunderstorm	31-03-17	1420 1700	1520 1800
Pahalgam	Northwest India	J & K	Thunderstorm	31-03-17	1918	1945
Kupwara	Northwest India	J & K	Thunderstorm	31-03-17	1630	1700
Kukernag	Northwest India	J & K	Thunderstorm	31-03-17	1350 1510 1845	1445 1540 2040
Barapani	Northeast India	Meghalaya	Thunderstorm	01-04-17	0600	0640
Cherrapunjee	Northeast India	Meghalaya	Thunderstorm	31-03-17	0835	1010
			Thunderstorm	31-03-17	1325	1600
			Thunderstorm	31-03/01-04-17	31/2240	01/0830
Guwahati	Northeast India	Assam	Thunderstorm	31-03/01-04-17	31/1935	01/0550
Itanagar	Northeast India	Arunachal Pradesh	Thunderstorm	31-03-17	1910	2100
Jorhat	Northeast India	Assam	Thunderstorm	31-03-17	1700	2330
Kailasahar	Northeast India	Tripura	Thunderstorm	01-04-17	0500	0650
Lengpui	Northeast India	Mizoram	Thunderstorm	31-03-17	1310	1550
			Thunderstorm	01-04-17	0650	0655
N/Lakhimpur	Northeast India	Assam	Thunderstorm	31-03-17	1900	2330
Shillong	Northeast India	Meghalaya	Thunderstorm	31-03-17	2210	2300
			Thunderstorm	01-04-17	0640	0730
Silchar	Northeast India	Assam	Thunderstorm	31-03-17	0830	1450
			Thunderstorm	01-04-17	0100	0550
			Thunderstorm	01-04-17	0620	0830
Thiruvananthapuram	South India	Kerala	Thunderstorm	31-03-17	1420	1425

Past 24 hours DWR Report:

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
Kolkata	01-04-17	310301-311431	NIL	NIL	NO ECHO	NIL	NIL
		311432-311551	Isolated single cell with maximum height of 13.88 Km at 1521 UTC and maximum reflectivity of 56.5 dBz at 1432 UTC	NNE (203km) moving in NE-ly then in ENE-ly direction at speed of 65 kmph	Cell started forming at 1411 UTC at NNE (205 Km) from radar. Matured. Moved out of RADAR range at 1551 UTC	Thunderstorm/ Rain	N/A
		311552-312351	NIL	NIL	NO ECHO	NIL	NIL
		010001-010301	NIL	NIL	NO ECHO	NIL	NIL
Paradeep	01-04-17	012030-010230	Isolated cells with average height of 7 km having maximum reflectivity of 22 dBZ with very small areas showing reflectivity values in the range of 15- 25 dBZ observed after mid night to morning over the sea.	Mainly concentrated in the sea areas to the south of the RADAR (175-240 degrees) at a distance of 90- 110kms from the RADAR.Position is almost stationary. Increased dBZ values observed between 2100to 0100 UTC.	NIL	NIL	NIL
Srinagar	01-04-17	310720-311510	Multiple cells developed at scattered places from different direction of DWR and gained Max. Height of 10Km. and Max. Ref. 46 dBZ at 750Z.	Developed at different directions of Srinagar around 720Z and moved towards SE of Srinagar and cloud dissipated at 15:10Z	Thunderstorm observed/reported at Gulmarg, Kupwara, Phalgam , Qazigund.	Nil	Very light to light rain in Anantnag, Kupwara, Baramulla ,, Kulgam dist
Agartala	01/04/17	310410-310740	Multiple Cells with Maximum Height 14 km and maximum reflectivity 44 dBZ	NNW (40 KM) from DWR Agartala moving ESE-wards at around 20 kmph	Cell dissipated at 0740 UTC of 31.03.17 over North Tripura & Mizoram	Thunderstorm with Rain	Unokoti, & North District
		310740-311110	Multiple Cells with Maximum Height of 14	North (150 KM) from DWR Agartala moving	Cell dissipated at 1110 UTC of 31.03.17 over	Thunderstorm with	North & Unokoti,

			km and maximum reflectivity 44 dBZ	SE-wards at around 35 kmph	Northern Tripura & South Assam	rain	Districts
		311700-010130	Multiple Cells with Maximum Height 15 Km and maximum reflectivity 50 dBZ	North (170 KM) from DWR Agartala moving SE-wards at around 30 kmph	Cell dissipated at 0130 UTC of 01.04.17 over Mizoram	Thunderstorm with rain	North & Unokoti, Districts
		010120-010300	Multiple Cells with Maximum Height 13 Km and maximum reflectivity 44 dBZ	NNE (110 KM) from DWR Agartala moving SE-wards at around 30 kmph	At 0300 UTC of 01.04.17, the cells still persist over Southern parts of Assam with increasing dBZ values	N/A	N/A
Mohanbari	01/04/17	311332-311422	Cell type- Multiple Avg. ht.- 7.5 Km MAX_Z:- 44.5 dbZ	Distance- 130 Km Direction- SW/ SSW & WSW Movement- NEly	Some Cells are slowly dissipated and some are newly formed	Thunderstorm with rain and gusty wind.	Jorhat, Sibsagar, Dibrugarh.
		311422-311812	Cell type- Multiple Avg. ht.- 7.5 Km MAX_Z:- 45.0 dbZ	Distance- 66 Km Direction- SW/ SSW Movement- NEly	Formed cells are become matured and moved NEly.	Thunderstorm with rain and gusty wind.	Sibsagar, Dibrugarh Tinsukia
Lucknow	01/04/17	310300-010300	Nil	Nil	Nil	Nil	Nil
Nagpur	01/04/17	310302-010302	Nil	Nil	Nil	Nil	Nil
Patiala	01/04/17	310302-010302	Nil	Nil	Nil	Nil	Nil
Patna	01/04/17	310300-010300	Nil	Nil	Nil	Nil	Nil
Jaipur	01/04/17	310300-010300	Nil	Nil	Nil	Nil	Nil