India Meteorological Department

FDP STORM Bulletin No. 16(21-03-2017)

1. CURRENT SYNOPTIC SITUATION at 0300 UTC of 21-03-2017:

SYNOPTIC FEATURES:

The Western Disturbance as an upper air cyclonic circulation over northwest Pakistan & adjoining Afghanistan now lies over north Pakistan and neighbourhood and extends upto 3.1 km above mean sea level.

The upper air cyclonic circulation over northern parts of West Bengal & neighbourhood extending upto 1.5 km above mean sea level now lies over northern parts of Bangladesh and adjoining Sub Himalayan West Bengal and extends upto 0.9 km above mean sea level.

A trough in lower level easterlies runs from Lakshadweep area to north Coastal Andhra Pradesh across Interior Karnataka at 1.5 km above mean sea level.

An upper air cyclonic circulation lies over Assam and adjoining Nagaland, Manipur, Mizoram & Tripura at 1.5 km above mean sea level.

The trough from the cyclonic circulation over northern parts of West Bengal & neighbourhood to interior Tamilnadu across interior Odisha, Telengana and Rayalaseema extending upto 0.9 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):

Broken multi/layered clouds over northwest J & K in association with western disturbance over the area.

Scattered low/medium clouds with embedded moderate to intense convection over South Interior Karnataka. Scattered low/medium clouds over north Uttarakhand, north Sikkim, Arunachal Pradesh, coastal Andhra Pradesh Kerala and Tamilnadu.

Arabian Sea:-

Scattered low/medium clouds with embedded moderate to intense convection over southwest Arabian Sea.

Bay of Bengal & Andaman Sea:

Scattered low/medium clouds with embedded isolated weak to moderate convection over south Bay of Bengal and south Andaman Sea.

Convection: Strong convection was observed over North West parts of India and South Kerala. Moderate convection was observed over Uttar Pradesh, Bihar and North East States.

OLR: Upto 340 wm^{-2} was over Gujarat Maharashtra Chhattisgarh Telangana North Karnataka, upto 310 wm^{-2} was over Rajasthan North Madhya Pradesh Jharkhand and Odisha, Upto 300 wm^{-2} was over North Rajasthan Uttar Pradesh South Interior Karnataka Coastal Tamilnadu, Upto 280 wm^{-2} was over Punjab, South Himachal Pradesh, South Uttarakhand and Up to 200 wm^{-2} was over South Kerala..

Jet Stream: No Jet stream observed.

Dynamic Features: A positive vorticity field is seen over east Uttar Pradesh Bihar and Coastal Kerala. Moderate to High wind shear observed over North West India and Moderate over Central India. Positive shear tendency observed over East Uttar Pradesh adjoin Bihar.

Precipitation:

IMR: Rainfall upto 50mm was observed over NW Jammu Kashmir, Rainfall upto 20mm N J&K EXT S Kerala Rainfall upto 10mm Rest J&K Extreme North Himachal Pradesh HP, East Bihar, North West Bengal, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and Assam, Coastal Andhra Pradesh, West Tamil Nadu South Kerala.

HEM: Rainfall up to 70 mm was observed over Extreme South Kerala , Rainfall up to 14mm was observed over rest South Kerala West Tamilnadu, Rainfall up to 7 mm was observed over East Bihar, Arunachal, Assam, South Mizoram Coastal Andhra Pradesh.

RADAR and RAPID observation:

Isolated convective cells observed over coastal Andhra Pradesh in DWR Composite at 1600 hrs IST and RGB satellite imagery at 1600 hrs IST. In RGB satellite imagery convection appears in progress over South Interior Karnataka also.

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

Dust concentration was observed over Arabian Peninsula. Dust concentration is expected to increase over northern India for next three days.

2. NWP MODEL GUIDANCE:

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

1. Weather Systems: Feeble trough at 12UTC in forecasts over J & K on all Days from Day0-4. Wind discontinuity only in Day-0-1: at 925 and 850 hPa extends over Karnataka, Telengana and Odisha. With entire belt shifting northwards in Day 3 and 4 (Maharashtra, Chhattisgarh, Odisha). 850hPa anti-cyclonic flow over central peninsula migrating to over Bay of Bengal in Day 0-2. Another broad anti-cyclonic flow over western Arabian Sea migrating to Gujarat coast in Day - 2 to Day - 4.

2. Location of jet and jet core at 500hPa:-**500hPa Jet core (>60kt)**: Weak in magnitude on all Days.

3. Convergence at 850 hPa: Weak noisy low level convergence at several places over India

4. Low level Vorticity:-Positive Vorticity (>15 x 10^{-5}/s): Lower values at 12UTC on all days. At 00 UTC high values along the west coast over peninsula.

5. Showalter Index: -3 to -4[Very Unstable]: Day-0: TN, Kerala and Karnataka. Day-1: Kerala –Karnataka coast. Day-1-2: J& K and HP region. Day-3: Bihar, WB and Bangladesh with parts of Anunachal.

6. K-Index :> 35[Very Unstable thunderstorm likely]: Day-0:TN, Kerala and Karnataka. Day-1: Kerala –Karnataka coast. Day-1-2: J& K and HP region. Day-3: Bihar, WB and Bangladesh with parts of Anunachal.

7. Spatial distribution of TTI: TTI >44 [Scattered Numerous Thunderstorms]: Day-0: TN, Kerala and Karnataka. Day-1: Kerala–Karnataka coast. Day-1-2: J& K and HP region. Day-3: Bihar, WB and Bangladesh with parts of Anunachal.

8. Rainfall and thunder storm activity: Day-1-3: (>4cm/day) Parts of J & k Region. Day-4-5:(>2cm/day) over Arunachal Pradesh.

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

1. **Weather Systems:** In the analysis, a CYCIR over coastal Odisha and another CYCIR over Assam and adjoin areas is noticed with presence of north-south trough over GWB to Bihar and adjoining Bangladesh. The NE-SW oriented trough from Bihar to south Odisha and adjoining north Andhra coast almost parallel to the east-coast is prominent during day 3 to day 5.

Another quasi-stationary CYCIR is seen over interior Karnataka, Marathwada and adjoining areas with slight movements towards north-west direction during next 4 to 5 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 Assam region on day 4. In the analysis, a deep trough in westerly lies over east off India which moves further eastward away from India in day 1.

3. Low level Vorticity:-Positive Vorticity (>15x10^{-5}/s):

Mainly along foothill of Himalaya and north-eastern states during next 5. The pocket of Vorticity maxima is concentrated towards Bihar, Jharkhand, GWB, Odisha, Chhattisgarh region during the morning hours on most of next 5 days. The significant vorticity zones associated with the cyclonic circulations are seen over Karnataka and Konkan-Goa during next 5 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): No significant zone is seen over the country during next 3 days. However, after the 78hr 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, Bihar 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.

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:

10-40 mm rainfall over Kerala and J & K region during next 2 days with J & K rainfall even on day 3 also. Subsequently on day 4 and 5 the rainfall is mainly over NE states.

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

1. Model reflectivity (Max. dBz): (>25 dBz) mainly over J & K region during next 3 days.

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

Total Total Index (> 50): Above threshold value mostly 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 but significant values are seen over some parts of peninsular India.

CAPE (> 1000): Mostly along south east coast of India over Andhra Pradesh and Tamilnadu during next 3 days. Another zone along 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 Orissa, coastal AP, coastal Karnataka and Konkan-Goa and some parts of UP, Haryana, Punjab and adjoining Rajasthan on day 3.
5. Rainfall activity: - Rainfall activity (~ 10-40 mm) over J & K region during next 3 days along with some parts over the extreme south peninsula (Kerala, TN and coastal AP region).

3. IOP ADVISORY FOR 24 and 48Hrs:

Summary and Conclusions:

Day 1 & Day 2:

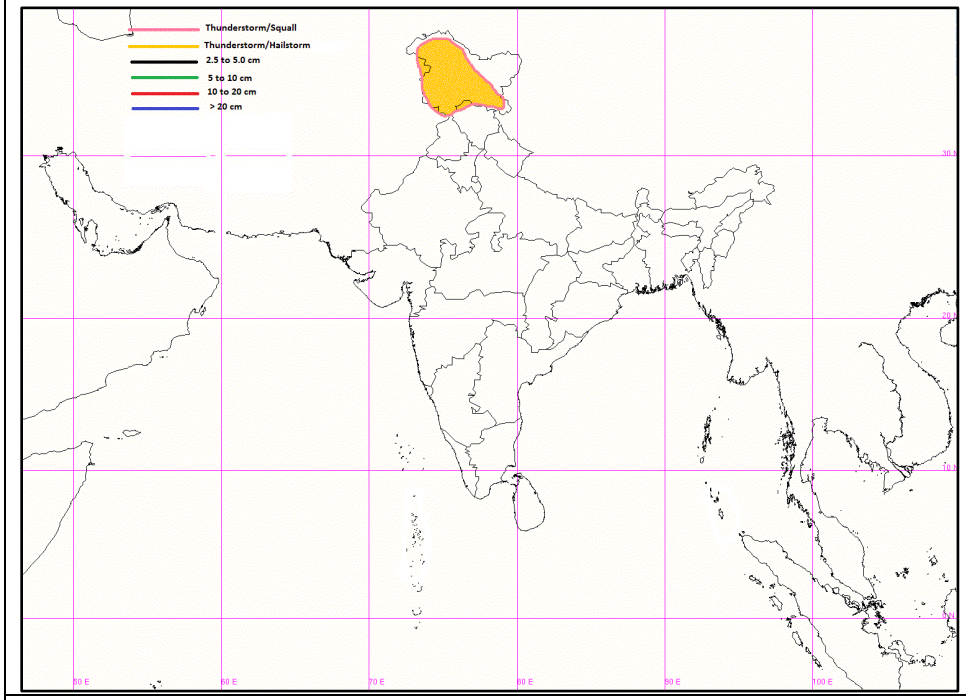
The Western Disturbance which now lies as an upper air cyclonic circulation in the lower levels, over north Pakistan and neighbourhood is likely to move slightly eastwards during the next 24 hours. This will increase the moisture flow from the Arabian Sea towards Jammu and Kashmir which will result in the likely increase in thunderstorm activity, accompanied by squally winds and instances of hail over the region of Jammu and Kashmir. On day 2, the cyclonic circulation is likely to move over the Indian region. This will increase the moisture flow over the region, resulting in increased amount of rainfall over Jammu and Kashmir and severe thunderstorm activity over Himachal Pradesh on day 2.

The trough in lower level easterlies, which runs from Lakshadweep area to north Coastal Andhra Pradesh across Interior Karnataka at 1.5 km is likely to result in meso-scale regions of thunderstorm activity over Coastal Andhra Pradesh, Interior Karnataka and Kerala during the next 24 hours.

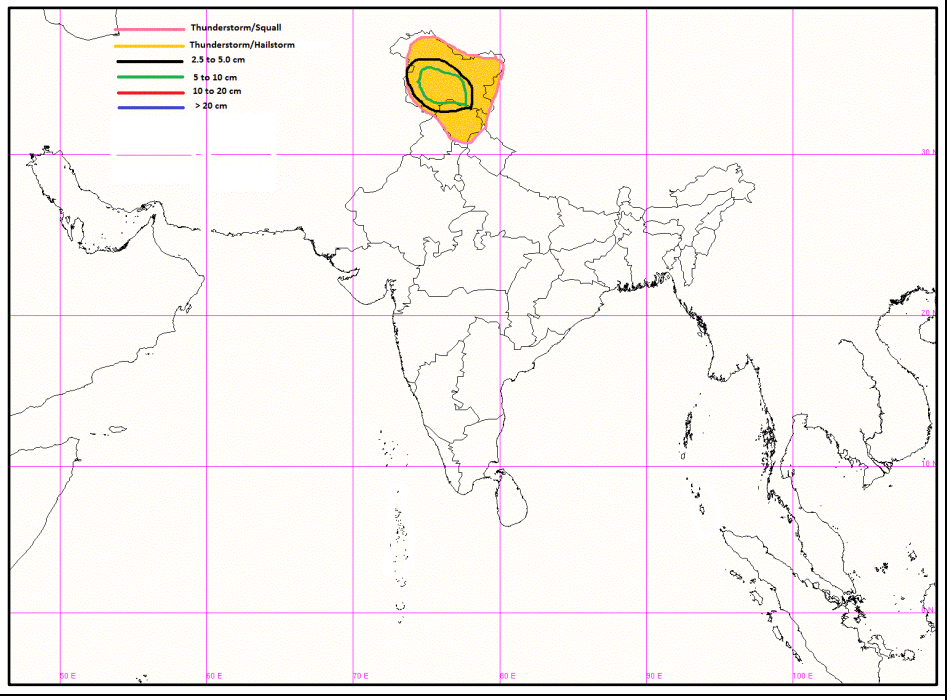
24 hour Advisory for IOP:
Jammu and Kashmir

48 hour Advisory for IOP:
Jammu and Kashmir
Himachal Pradesh

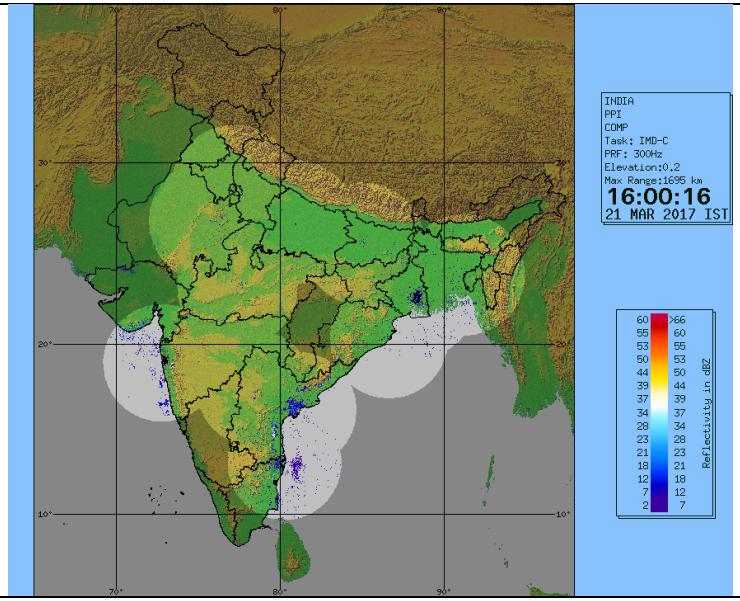
For NCMRWF NWP products:(http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php)
For IMD NWP products:(http://nwp.imd.gov.in/diagpro_new.php)
For Synoptic plotted data and charts
http://amssdelhi.gov.in/
http://www.amsskolkata.gov.in/
For RAPID tool:
http://rapid.imd.gov.in/
Low Level Winds
http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2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



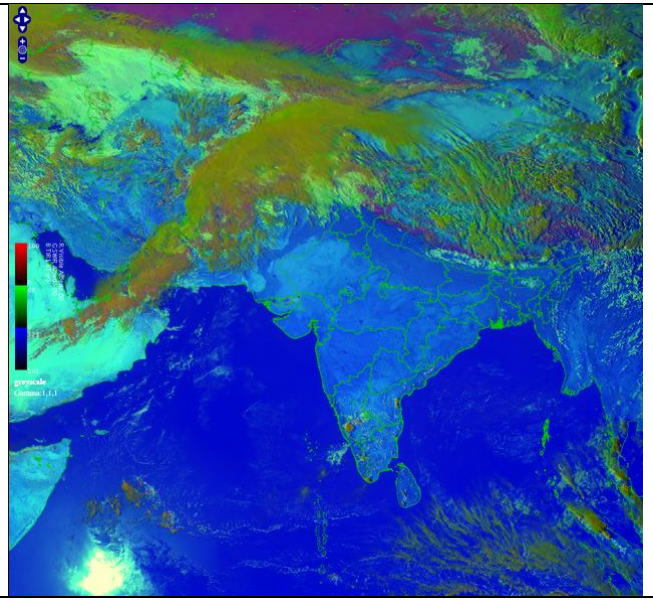
IOP Advisory for 24hours



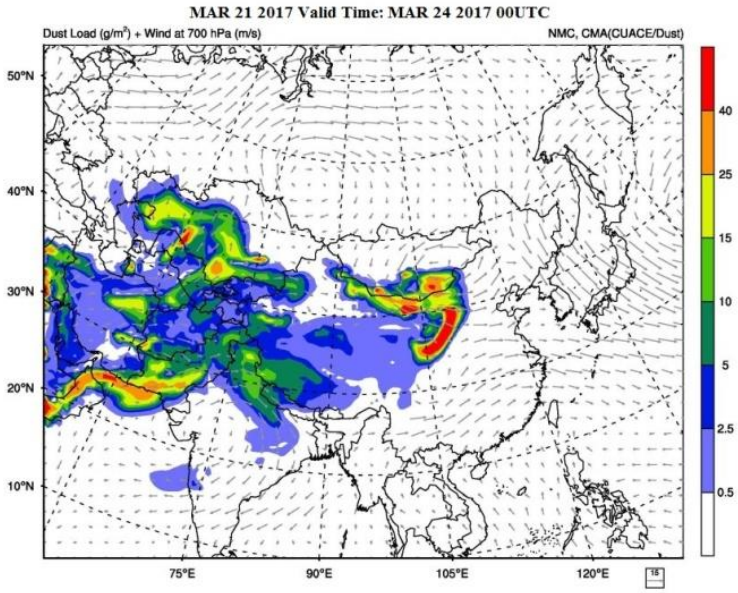
IOP Advisory for 48hours



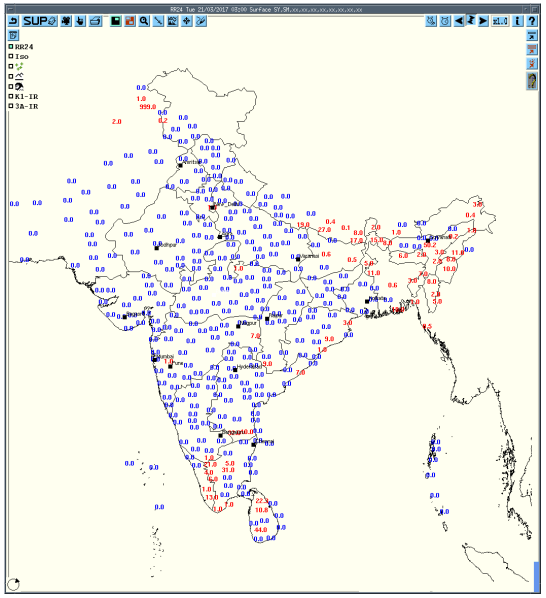
DWR Composite at 1600 hrs IST



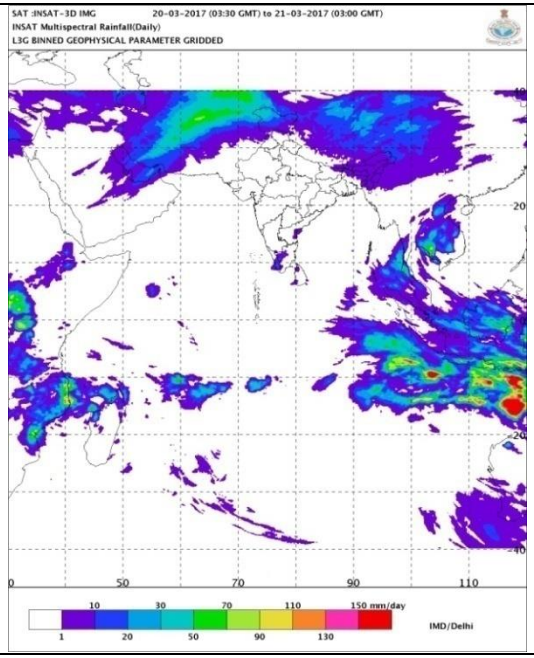
RGB Image of INSAT3D at 1600 hrs IST



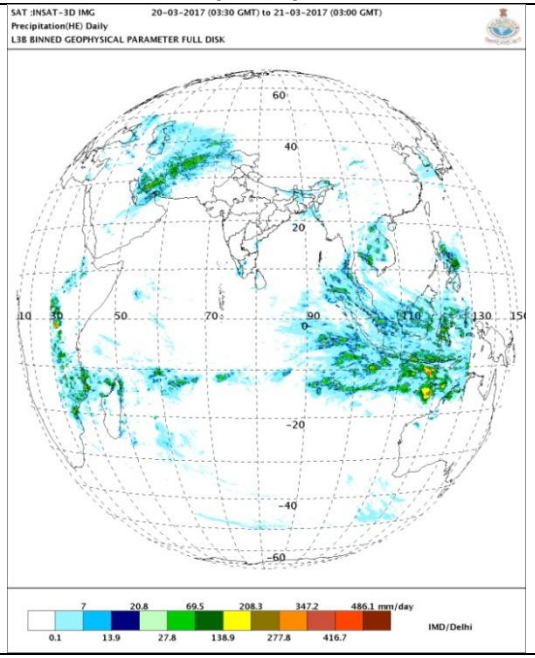
Forecast Dust Concentration at 00UTC of 24 March



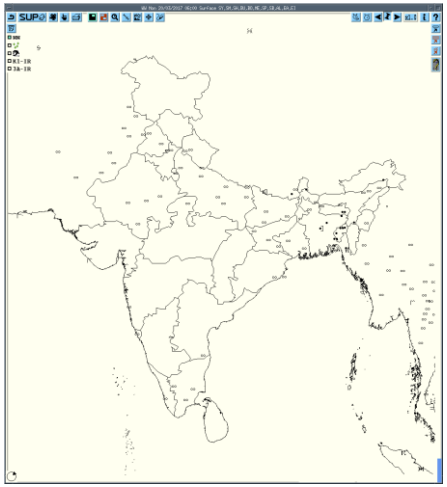
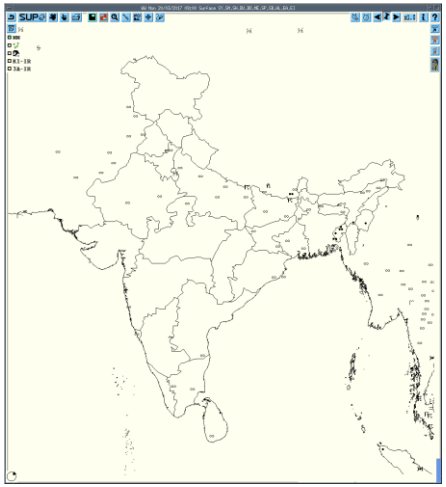
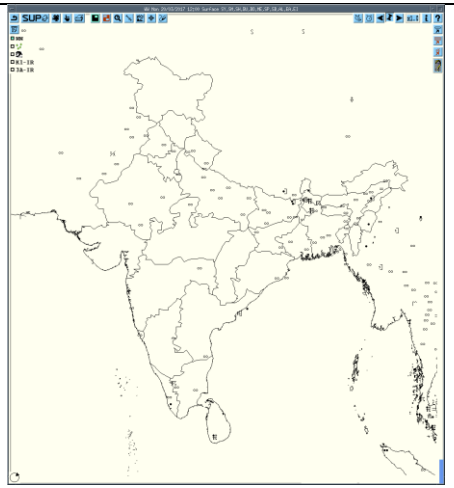
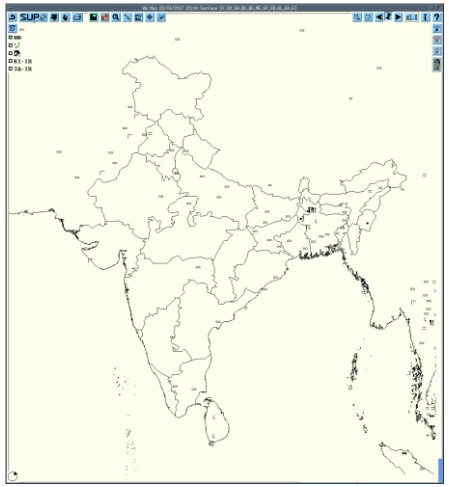
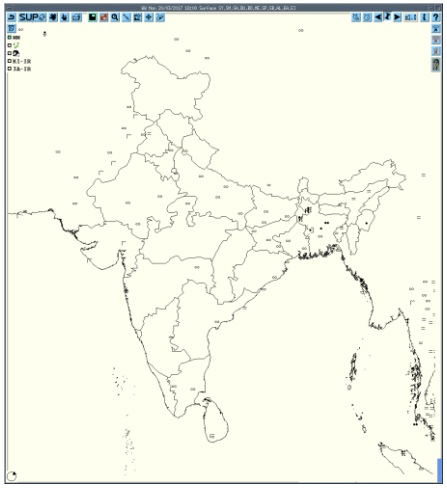
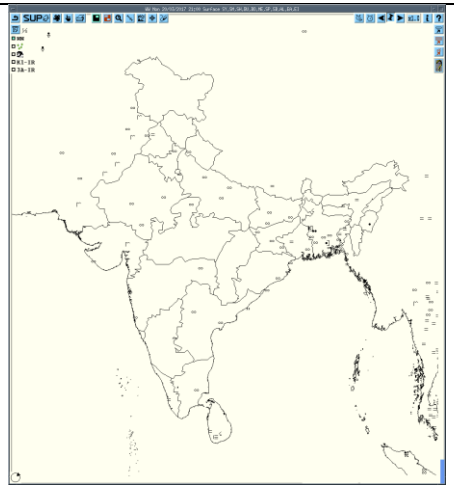
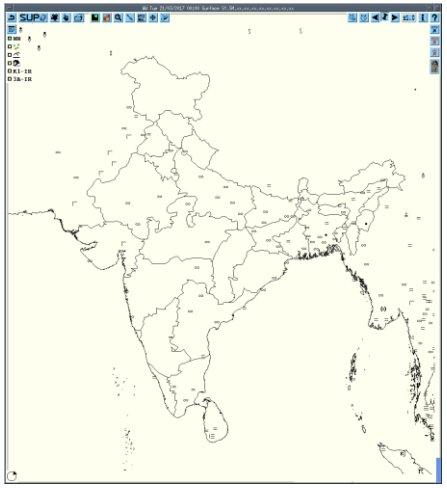
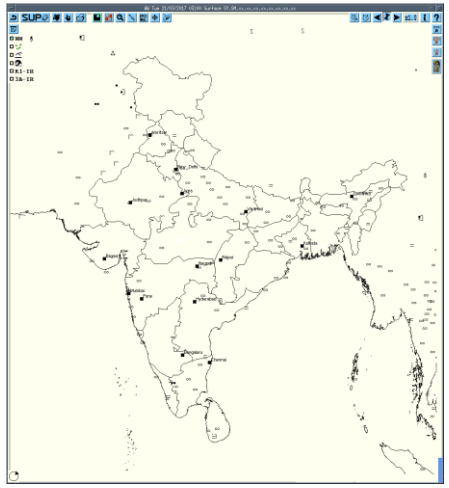
Accumulated 24 Hour rainfall (in red) recorded at 0300 UTC of today



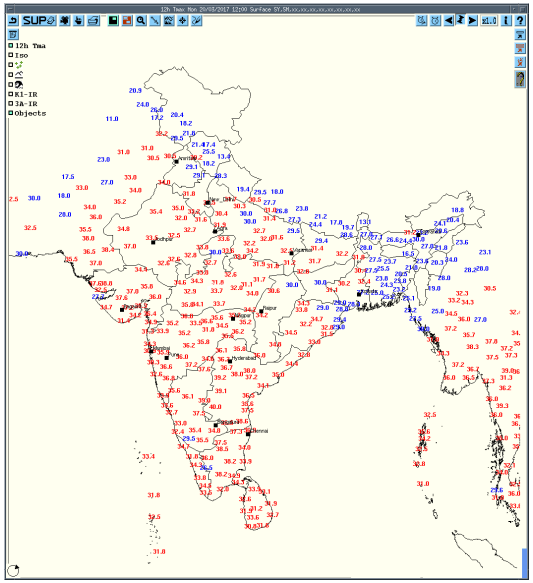
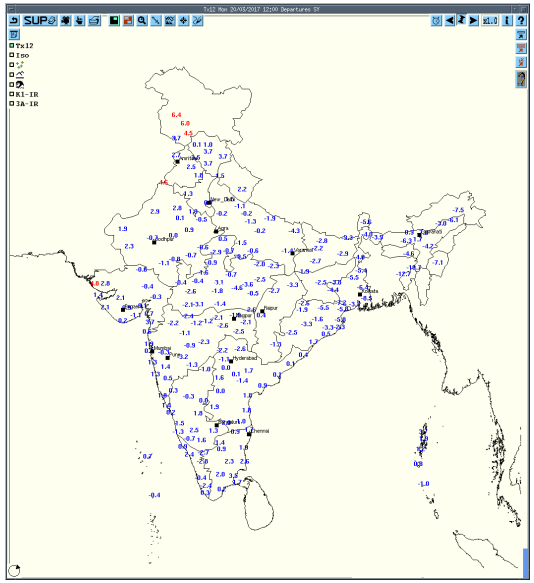
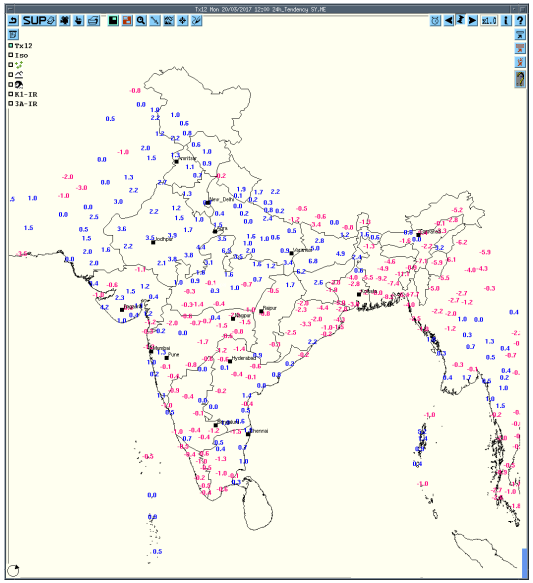
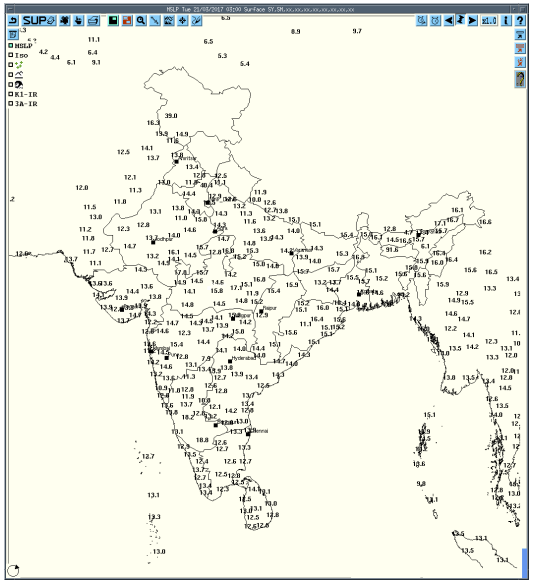
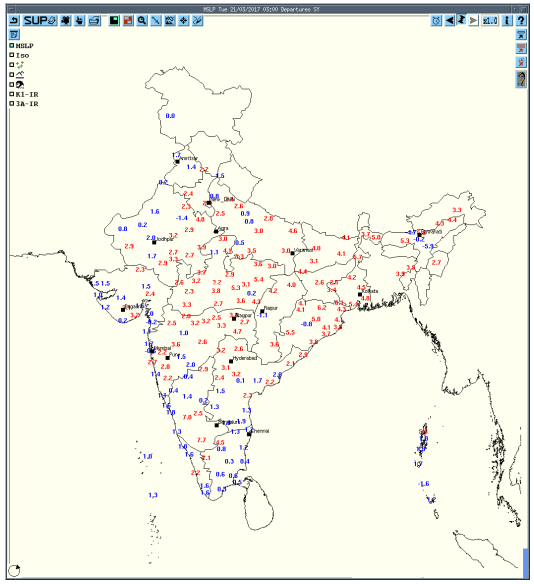
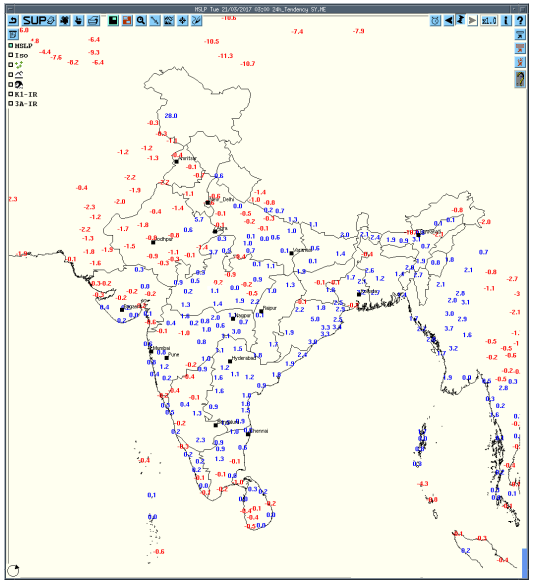
IMR Rainfall

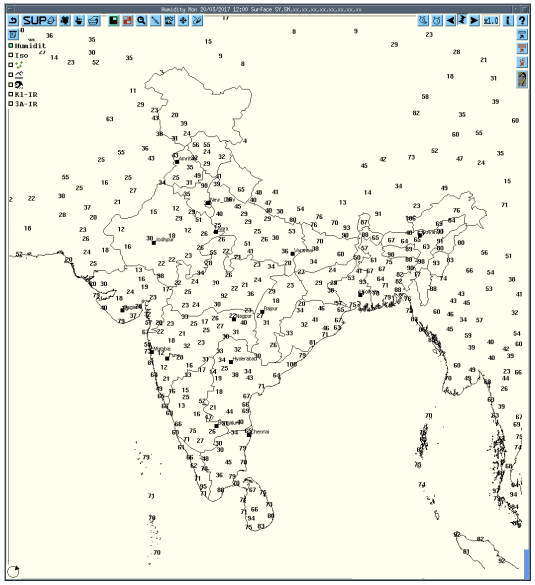
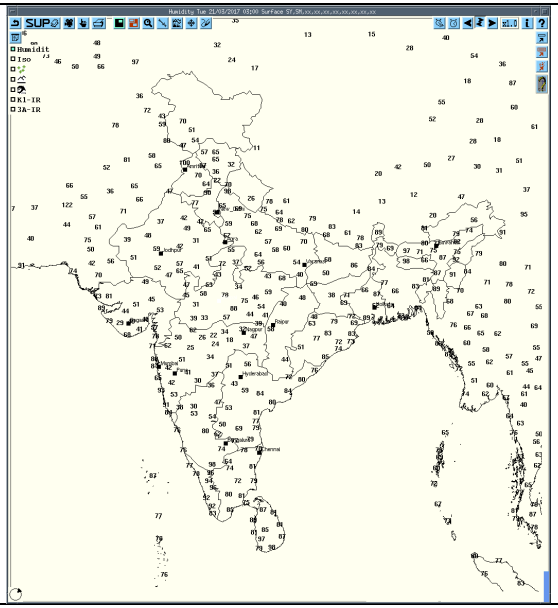


HEM Rainfall

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**
20-03-2017	0600 UTC	Nil	Nil	Nil	Nil
20-03-2017	0900 UTC	Nil	Nil	Nil	Nil
20-03-2017	1200 UTC	Bagdogra	East India	West Bengal	Thunderstorm
		Jalpaiguri	East India	West Bengal	Thunderstorm
		Coochbehar	East India	West Bengal	Thunderstorm
		Coonoor	South India	Tamilnadu	Thunderstorm
		Tuni	South India	Andhra Pradesh	Thunderstorm
20-03-2017	1500 UTC	Nil	Nil	Nil	Nil
20-03-2017	1800 UTC	Malda	East India	West Bengal	Thunderstorm
21-03-2017	2100 UTC	Nil	Nil	Nil	Nil
21-03-2017	0000 UTC	Nil	Nil	Nil	Nil
21-03-2017	0300 UTC	Nil	Nil	Nil	Nil

Name of Station Reporting	**Region**	**STATE**	**Weather Event**	**Date**	**Time of Commencement (IST)**	**Time of end (IST)**
Gangtok	East India	Sikkim	Thunderstorm	20-03-17	1540	1600
Coochbehar	East India	West Bengal	Thunderstorm	20-03-17	1640	1830
Jalpaiguri	East India	West Bengal	Thunderstorm	20-03-17	1425	1740
Malda	East India	West Bengal	Thunderstorm	20-03-17	1750 2300	1930 2350
Malda	East India	West Bengal	Lightning	20-03-17	1745 2330	2000 2400
Bhagalpur	East India	Bihar	Thunderstorm	20-03-17	2050	2115
Bhagalpur	East India	Bihar	Lightning	20-03-17	2045	2120
Purnia	East India	Bihar	Thunderstorm	20-03-17	1600	1830
Dhubri	NE India	Assam	Thunderstorm	20-03-17	1945	2230
Lengpui	NE India	Mizoram	Thunderstorm	20-03-17	1042	1048
Tuni	South India	Andhra Pradesh	Thunderstorm	20-03-17	1510	1630
Tuni	**South India**	**Andhra Pradesh**	**Hail**	**20-03-17**	**1545**	**1630**
Visakhapatnam	South India	Andhra Pradesh	Thunderstorm	20-03-17	1605	1615

Severe Weather warning based on DWR observation	
Name of issuing Radar station	**DWR Patna**
Geo-coordinates of issuing Station(Lat, Long,Alt)	---
Date and time of issue in UTC (yyyyMMddhhmm)	201703210600 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)	201703210700
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)	201703210700
Nature of severe weather expected	Nil
Name of issuing Radar station	**DWR HYDERABAD**
Geo-coordinates of issuing Station(Lat, Long,Alt)	Lat–17.2562^{o}NLong-78.7656^{o}E
Date and time of issue in UTC (yyyyMMddhhmm)	201703210620 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)	201703210620
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)	201703210721 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)	**201703210511**
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	20/03/17	0302-2352	Nil	Nil	No Echoes	Nil	Nil
	21/3/2017	0002 -0252	Nil	Nil	No Echoes	Nil	Nil