



India Meteorological Department

FDP STORM Bulletin No. 15 (21-03-2018)

1. CURRENT SYNOPTIC SITUATION:

NWFC INFERENCE (0300UTC of the Day):

- ◆ The Western Disturbance as an upper air cyclonic circulation over Pakistan and adjoining Jammu & Kashmir persists and now extends upto 7.6 km above mean sea level.
- ◆ A trough runs from this cyclonic circulation to northwest Madhya Pradesh across Punjab and Haryana and extends upto 1.5 km above mean sea level.
- ◆ The cyclonic circulation over southeast Rajasthan & adjoining West Madhya Pradesh has become less marked.
- ◆ A trough/ wind discontinuity at 0.9 km above mean sea level runs from Madhya Maharashtra to South Interior Karnataka across North Interior Karnataka.
- ◆ A cyclonic circulation extending upto 0.9 km above mean sea level lies over north Chhattisgarh & neighbourhood.
- ◆ The cyclonic circulation over Comorin area and neighbourhood persists and now extends upto 1.5 km above mean sea level.
- ◆ The cyclonic circulation over Vidarbha & neighbourhood has become less marked.
- ◆ The trough from north Odisha to North Interior Karnataka has also become less marked.
- ◆ The cyclonic circulation over southeast Arabian Sea off Kerala Coast has become less marked.
- ◆ The feeble trough of low at mean sea level over Equatorial Indian Ocean and adjoining central parts of south Bay of Bengal has become less marked.

SATELLITE OBSERVATIONS during past 24hrs and current observation:

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

Western Disturbance (WD):

Scattered multi-layered clouds seen over North Pakistan and Jammu & Kashmir in association with WD over the area.

Clouds description within India:

Scattered low/medium clouds with embedded weak to moderate convection seen over West Uttarakhand, Himachal Pradesh and West Punjab. Isolated low/medium clouds with embedded weak to moderate convection seen over rest Punjab, Haryana, West and Southeast Uttar Pradesh. Scattered low/medium clouds were seen over Chhattisgarh, Sikkim and Sub-Himalayan West Bengal adjoining Assam. Isolated low/medium clouds were observed over North Odisha, north Arunachal Pradesh, East Madhya Pradesh, North Rajasthan, Telangana and North Interior Karnataka.

Arabian Sea:-

Scattered low/medium clouds with embedded moderate to intense convection seen Southwest Arabian Sea.

Arabian Sea:

No significant clouds over the region.

Bay of Bengal & Andaman Sea:

Isolated low/medium clouds seen over Nicobar Islands.

Past Weather:**Convection (during last 24 hrs):**

Weak to moderate convection was observed over J&K Himachal Pradesh Uttarakhand Punjab north Rajasthan.

OLR:-

Upto 230 w m^{-2} was observed over J&K Himachal Pradesh Uttarakhand Punjab north Rajasthan north Haryana

Dynamic Features:

Negative shear tendency is observed over east Rajasthan & N/Hood and Positive shear tendency over rest parts of India.

Medium to high wind shear is observed over North & Central India and low wind shear over South Peninsula region.

Precipitation:**IMR:**

Rainfall upto 10-30 mm observed over west J&K.

Rainfall upto 01-20 mm observed over rest J&K Himachal Pradesh west Uttarakhand adjoining UP west Punjab extreme north Rajasthan extreme north-east Arunachal Pradesh.

HEM:

Rainfall upto 14 mm observed over some parts of south-west J&K Himachal Pradesh SW Uttarakhand Punjab north Rajasthan & central Madhya Pradesh.

RADAR and RAPID RGB Observation:

Isolated/multiple moderate echoes are seen on DWR Delhi (dBZ around 50 & height 10-12km), Patiala (dBZ around 45-50 & height 10-12km) and Srinagar (dBZ around 40 & height 8km) domains at around 1200 IST. Isolated light echoes are also seen on DWR Lucknow domain at around 1200 IST.

RAPID RGB Satellite imagery at 1100IST indicates significant convection over Jammu & Kashmir, Himachal Pradesh, West Uttarakhand adjoining Northern parts of Uttar Pradesh, South Punjab and adjoining North Rajasthan & west Haryana.

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

Higher Dust concentration was observed over Arab countries and northern part of Africa. Dust concentration is expected to decrease over north-western part of India for next five days. PM10 concentration is expected to increase over IGP in next five days.

Particulate matter concentration is expected to remain in moderate to poor category for next 2 days in Delhi.

Delhi – SAFAR analysis & Forecast	21.03.2018	22.03.2018
PM10 (micro-g/m3)	210	168
PM2.5 (micro-g/m3)	102	82

2. NWP MODEL GUIDANCE:

NCMRWF (NCUM forecast based on 000UTC of the day):

1. Weather Systems:

Low level CYCIRS, Troughs:

12 UTC of Day 0-4: 850 hPa north-south trough over Bangladesh and adjoining parts of East & NE India

00 UTC of Day 1-2: 850 hPa trough from Bangladesh to peninsular India through Jharkhand and West Bengal, Odisha, AP.

12 UTC of Day 0: Induced CYCIR in lower levels over Pakistan & adjoining Punjab regions

Confluence & Wind Discontinuity Regions:

12 UTC of Day 0: W-E wind discontinuity over peninsular India & NW-SE in Day 4 over Odisha -AP

Synoptic Systems:

At 500 hPa WD and associated cyclonic circulation over Punjab and adjoin areas of J & K, HP

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

12 UTC of Day 0-4: Weaker core in all the days except in Day 4 over central India.

3. Convergence at 850 hPa:

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

Day0: NE NMMT, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, East RJ, Odisha, Coastal AP, SI Karnataka,

Day1: Odisha, Chhattisgarh,

Day2: Arunachal Pradesh, Assam Meghalaya, Jharkhand, Odisha, Coastal AP, TN Puducherry, SI Karnataka, Kerala,

Day3: Assam Meghalaya, Odisha, East MP, Madhya Maharashtra, Coastal AP, TN Puducherry, SI Karnataka, Kerala,

Day4: Arunachal Pradesh, Jharkhand, Odisha, West MP, East MP, Madhya Maharashtra, Coastal AP, Coastal Karnataka, SI Karnataka, Kerala.

4. Low level Vorticity:-Positive Vorticity:

Day/Index : Subdivisions with Lower Level Vortex > 15×10^{-5} /s

Day0: East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab,

Day1: Arunachal Pradesh, Assam Meghalaya, NE NMMT, TN Puducherry,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Odisha,

Day3: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Gangetic WB, Himachal Pradesh,

Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Uttarakhand, Odisha, SI Karnataka, Kerala.

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

Day/Index : Subdivisions with Showalter Index < -4

Day0: Arunachal Pradesh, Sub Himalayan WB, Uttarakhand, Punjab, Kerala,

Day1: Arunachal Pradesh, Sub Himalayan WB, Jharkhand, Odisha, TN Puducherry,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Odisha, TN Puducherry, Kerala,

Day3: Arunachal Pradesh, Sub Himalayan WB, Uttarakhand, Himachal Pradesh, Kerala,

Day4: Arunachal Pradesh, Sub Himalayan WB.

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

Day/Index : Subdivisions with K Index > 40

Day0: Arunachal Pradesh, Sub Himalayan WB, Chhattisgarh, TN Puducherry, SI Karnataka, Kerala,

Day1: Odisha, Coastal AP, Telangana, TN Puducherry, SI Karnataka,

Day2: Arunachal Pradesh, NE NMMT, Gangetic WB, Coastal AP, TN Puducherry, Kerala,

Day3: Arunachal Pradesh, Sub Himalayan WB, Uttarakhand, Telangana, TN Puducherry, Kerala,

Day4: Arunachal Pradesh, Sub Himalayan WB.

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

Day/Index : Subdivision with Total Totals Index > 52

Day0: Arunachal Pradesh, Sub Himalayan WB, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Chhattisgarh,

Day1: Arunachal Pradesh, Assam Meghalaya, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Bihar, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha,

Day3: Arunachal Pradesh, Uttarakhand, Punjab, Himachal Pradesh, Jammu Kashmir,

Day4: Arunachal Pradesh, Sub Himalayan WB, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir.

8. Rainfall and thunder storm activity:

Day/Index : Subdivisions with Precipitation > 2 cm

Day1: West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir,

Day2: Arunachal Pradesh, Assam Meghalaya,

Day3: Arunachal Pradesh, Assam Meghalaya, NE NMMT,

Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Jammu Kashmir,

Day5: Arunachal Pradesh, Andaman Nicobar.

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

1. Synoptic Systems:

The analysis based on 00 UTC shows a cyclonic circulation in lower troposphere over North Pakistan and adjoining Punjab. A trough extends from this cyclonic circulation extends to East Madhya Pradesh. Forecast shows the movement of the cyclonic circulation slightly north eastwards on day 1 and becomes less marked thereafter. There is another circulation over coastal Andhra Pradesh which moves westward and lies over Telangana on day 1 and a north-south trough extends from this system to extreme south peninsula which persist for next three days. A cyclonic circulation persists over Assam and adjoining area during next three days. Forecast also shows formation of a cyclonic circulation over Orissa and adjoining area on day 3 and persists during subsequent 24 hours.

2. Location of Jet and Jet Core (>60kt) at 500hPa:

Although the presence of strong westerlies is found but no jet core over the Indian region for the next 3 days.

3. Low Level Vorticity {850hPa Positive Vorticity (>12 x 10⁻¹/s)}:

Mostly along foothills of Himalayas and along the north-south trough over the central parts of the country to Karnataka during next 3 days..

4. Spatial distribution of T-storm Initiation Index, Lifted Index, Total Total Index, CAPE, CIN and Sweat Index [High potential for thunderstorm]:

T-Storm Initiation Index (> 3): Higher than a value 3 over parts of Gujarat coastal areas of Gangetic West Bengal, Orissa, Andhra Pradesh, Telangana, Kerala, Karnataka, Tamil Nadu, coastal Maharashtra, Konkan & Goa, coastal areas along the east coast and west coast extreme south peninsular India on all 3 days. Higher than threshold value is seen on day 1 over parts of Punjab and Haryana. Maximum value of index is seen along the east coast GWB and adjoining coastal Orissa, Andhra Pradesh on day 2 and 3.

Lifted Index (< -2): The threshold value of the is below -2 over parts of Gujarat, South west Rajasthan, Punjab Haryana, Delhi, Himachal Pradesh, Uttarakhand, Uttar Pradesh, some parts of east Madhya Pradesh on day 1 southern part of west coast, along the east coast, and coastal Orissa, Andhra Pradesh, coastal Karnataka, Kerala and Tamil Nadu on all 3 days; maximum negative value of the index can be seen on day 2 and 3 over coastal area along east coast and southern part of west coast, GWB, Orissa, Kerala, Andhra Pradesh and Tamil Nadu.

Total Total Index (> 50) : Above threshold value over parts of Uttarakhand, foothills of Himalaya, Uttar Pradesh, GWB on day 1; over parts of East Uttar Pradesh adjoining Madhya Pradesh, Jharkhand, Chhattisgarh, Madhya Maharashtra, Marathawada, northern part of west coast on day 2; on day 3 over parts of Gujarat adjoining Rajasthan, east and west Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Orissa, Andhra Pradesh, Karnataka, Telangana, coastal Maharashtra, Madhya Maharashtra and Marathawada; Maximum value is seen over parts Madhya Maharashtra and Marathawada on day 3.

Sweat Index (> 300): Parts of NE states, Coastal areas of GWB, Peninsular India, Konkan & Goa, Madhya Pradesh, Chhattisgarhi, Bihar, Jharkhand, Rajasthan, Orissa, Madhya Maharashtra, Marathawada, adjoining Vidarbha, J&K, Punjab, Haryana, Delhi, coastal areas of south and east coast during all 3 days. Maximum value of the index can be seen over GWB adjoining Jharkhand, coastal Orissa and adjoining area on day 3.

CAPE (> 1000): Mostly along coastal areas of southern peninsular India along west coast and over east coast and coastal areas of GWB and Orissa and Andhra Pradesh and some parts of Gujarat during all 3 days. Maximum value can be seen on day 2 and 3 over coastal Orissa, GWB and coastal Andhra Pradesh.

CIN (50-150): Mostly over parts of Gujarat, along east coast along west coast from Saurashtra & Kutch to coastal Karnataka, Konkan and Goa, coastal Orissa, Telangana, Andhra Pradesh and GWB during next 3 days.. Over parts of west Rajasthan, Madhya Pradesh, Chhattisgarhi, J&K, Punjab, Haryana, Delhi, Uttarakhand, Himachal Pradesh, Uttar Pradesh and Madhya Pradesh on day 1. Maximum value of the index is seen over parts of GWB and Assam and adjoining area on day 3..

5. Rainfall Activity:

10- 40 mm rainfall: On day 1 over parts of Punjab, Himachal Pradesh, Uttarakhand ; on day 2 over parts of Uttarakhand and Arunachal Pradesh and Kerala ; on day 3 over some parts of Kerala and Arunachal Pradesh.

Up to 10 mm rainfall: Over parts of J&K, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh, and Kerala, Tamil Nadu, Arunachal Pradesh, and adjoining area on day 1. J&K, Himachal Pradesh, Uttarakhand, Orissa, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu on day 2 and 3. Over parts of west Bengal on day 3..

3. IOP ADVISORY FOR 24 and 48Hrs:

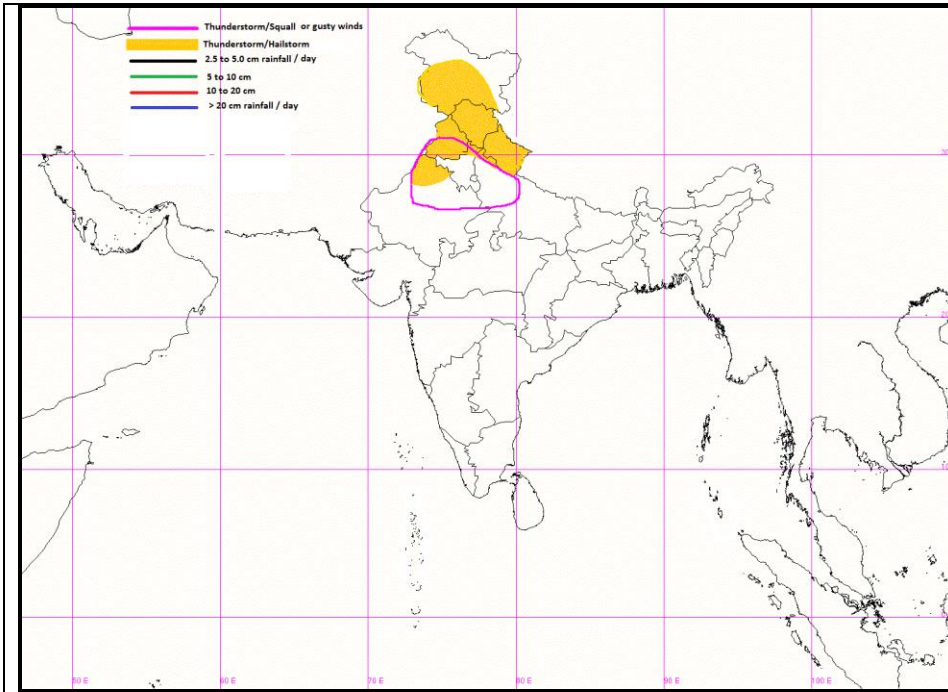
Summary and Conclusions:

Day-1 & Day-2:

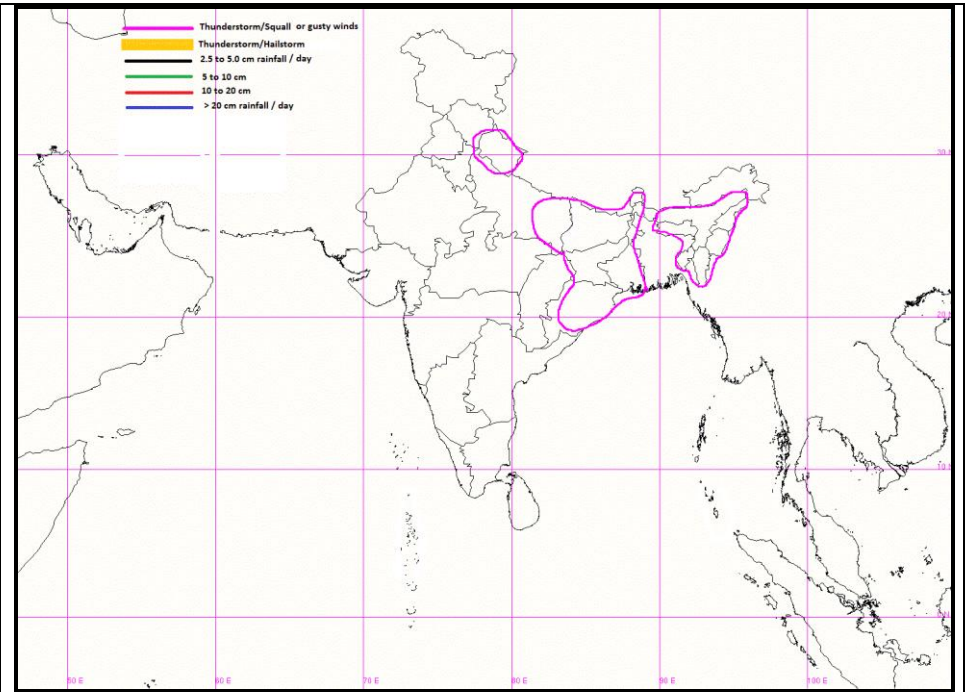
Synoptic analysis indicates that there is a Western Disturbance as an upper air cyclonic circulation over Pakistan and adjoining Jammu & Kashmir. Apart from this, a trough runs from this cyclonic circulation to northwest Madhya Pradesh across Punjab and Haryana. These features are likely to result in thunderstorm with hail over Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Punjab and North Rajasthan on Day-1. Thunderstorms with gusty winds are likely over Haryana, Delhi and West UP on Day-1. On Day-2, thunderstorms are expected to occur over East and Northeast India.

24 hour Advisory for IOP:	48 hour Advisory for IOP:
Rainfall:	Rainfall:
Nil	Nil
Thunderstorm with associated phenomenon:	Thunderstorm with associated phenomenon:
Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Punjab, Haryana, North Rajasthan, West Uttar Pradesh.	Uttarakhand, East Uttar Pradesh, Bihar, Jharkhand, Odisha, Gangetic West Bengal, Sub-Himalayan west Bengal, Sikkim, Assam, Meghalaya, Nagaland, Manipur, Mizoram Tripura.

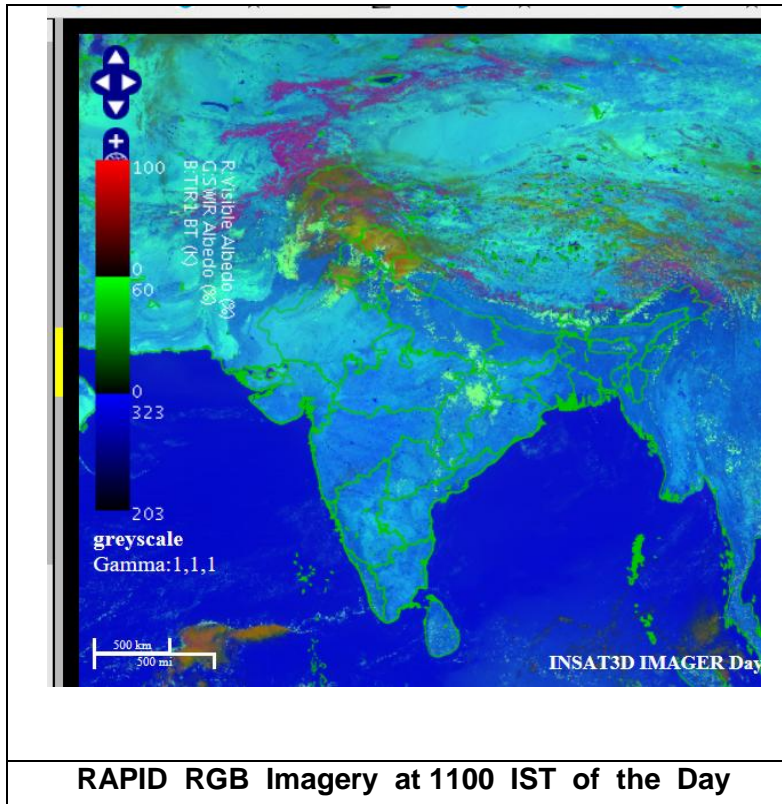
Graphical Presentation of Potential Areas for Severe Weather:



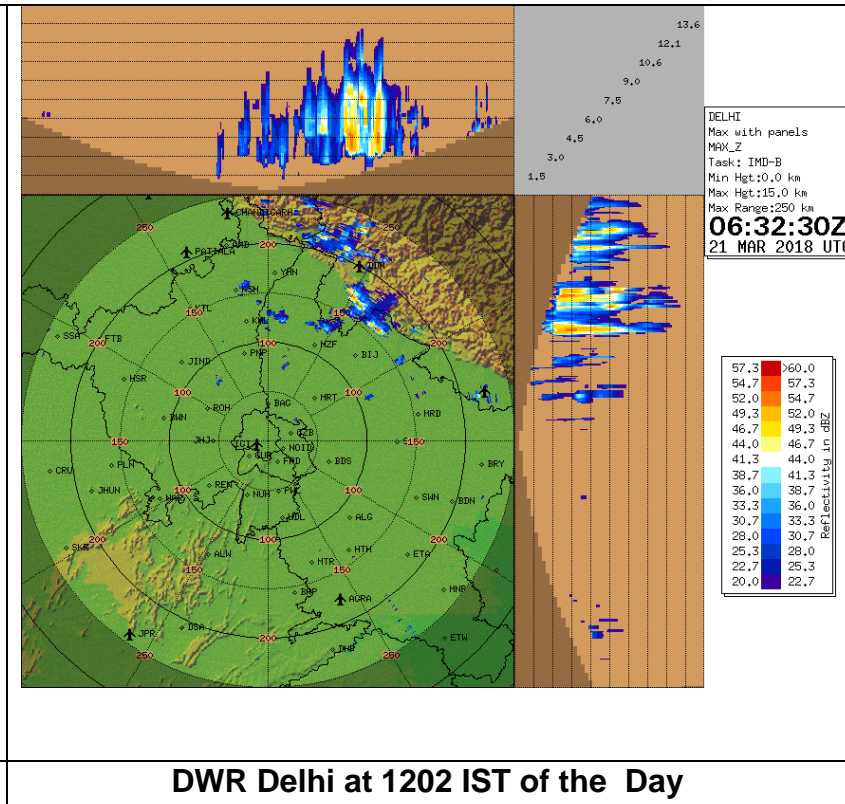
IOP Advisory for 24 hours



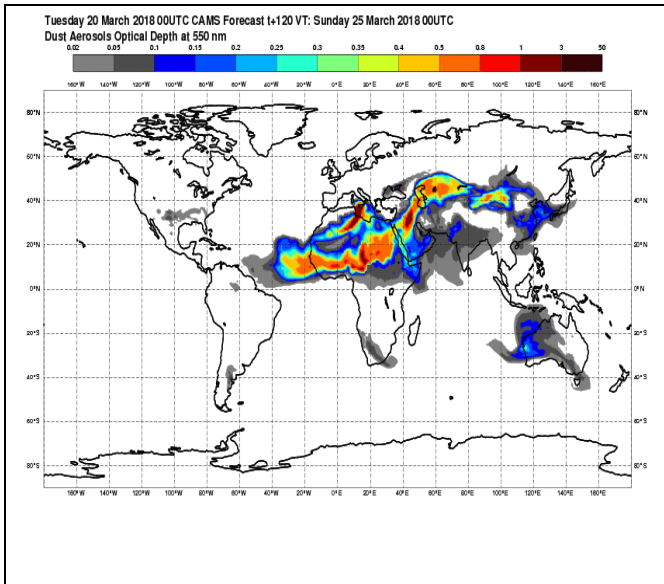
IOP Advisory for 48 hours



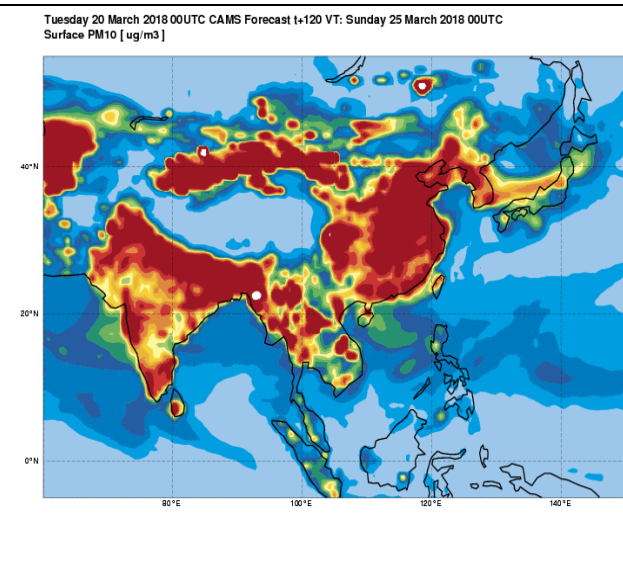
RAPID RGB Imagery at 1100 IST of the Day



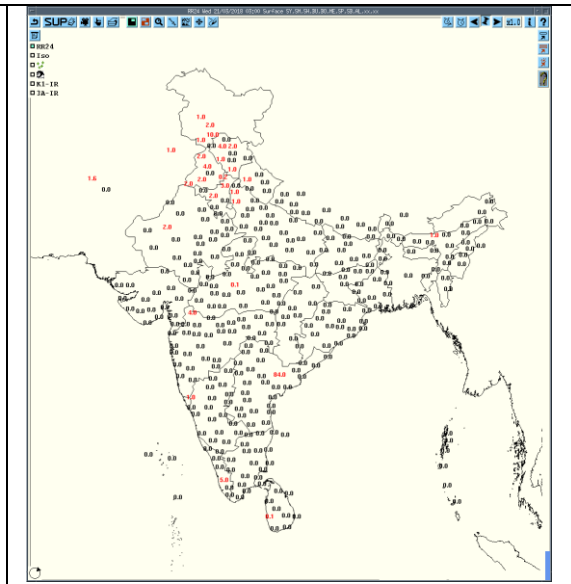
DWR Delhi at 1202 IST of the Day



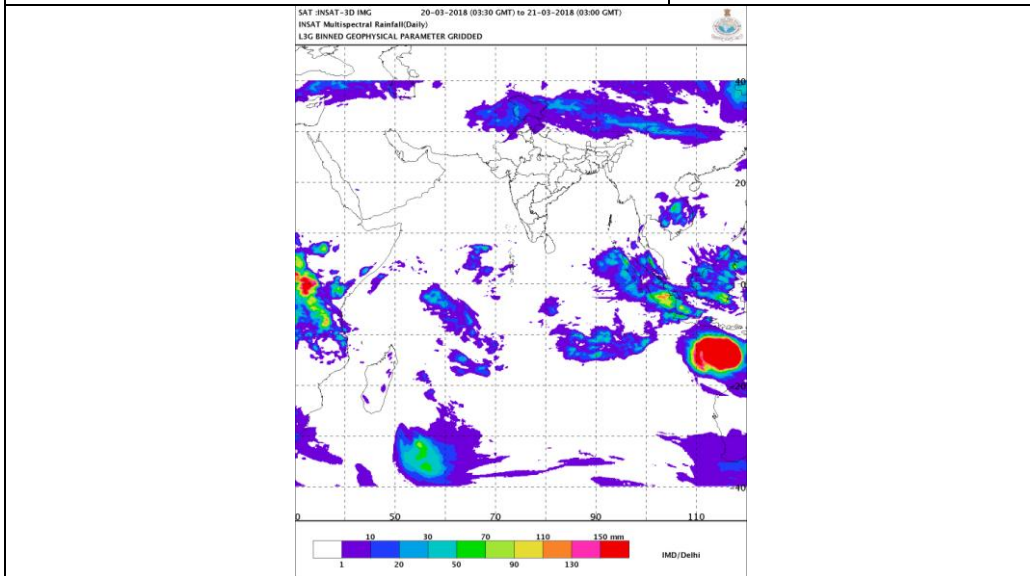
Forecast Dust Concentration



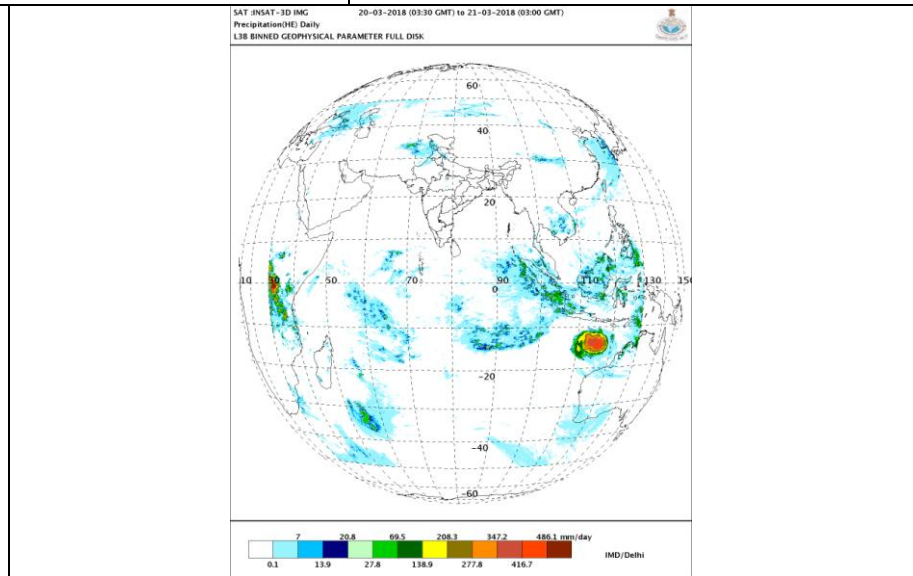
PM10 Forecast



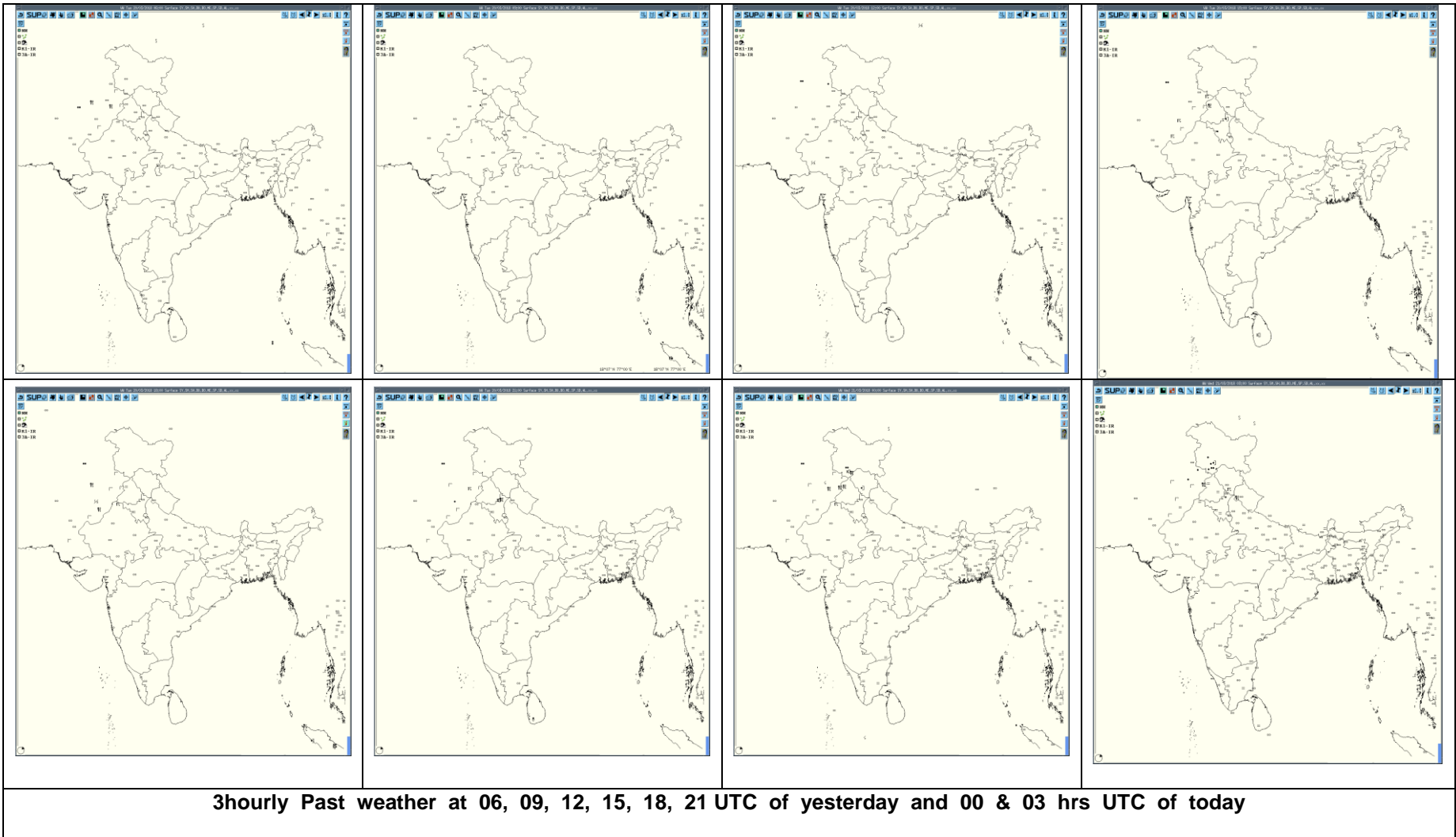
Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today

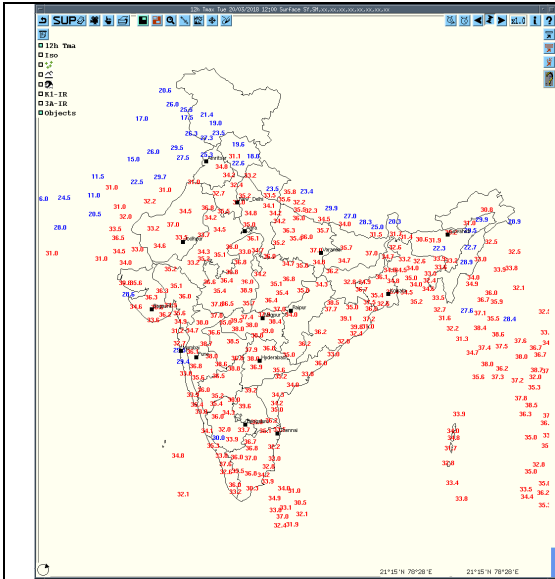


IMR

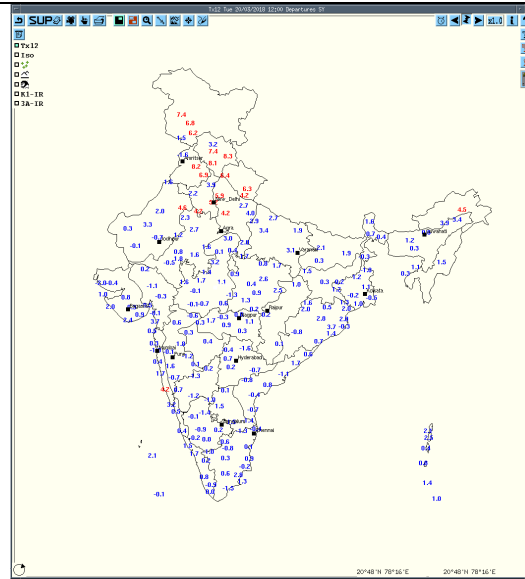


HEM

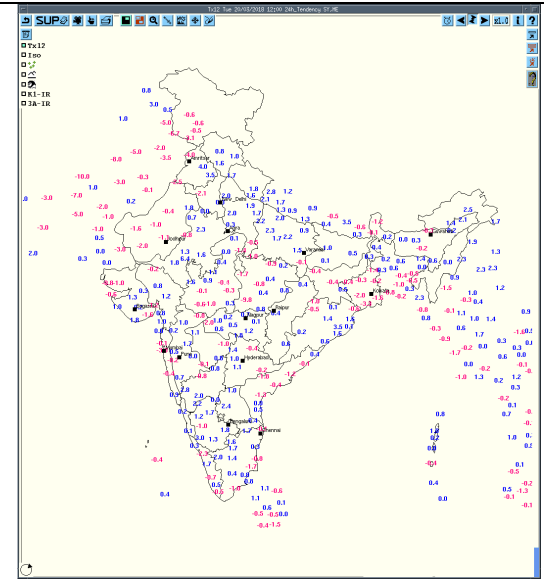




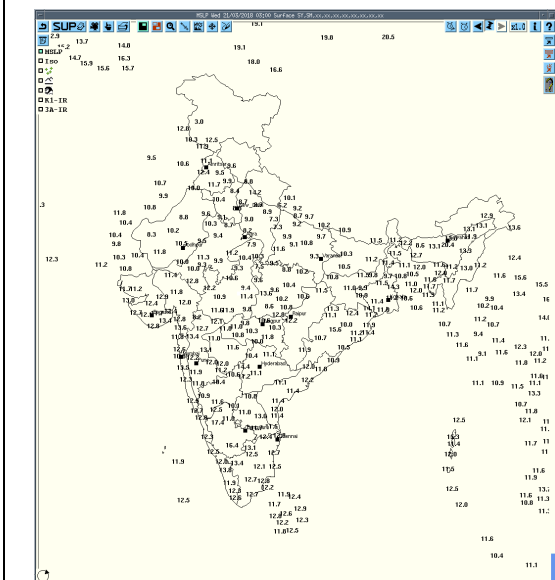
Tmax



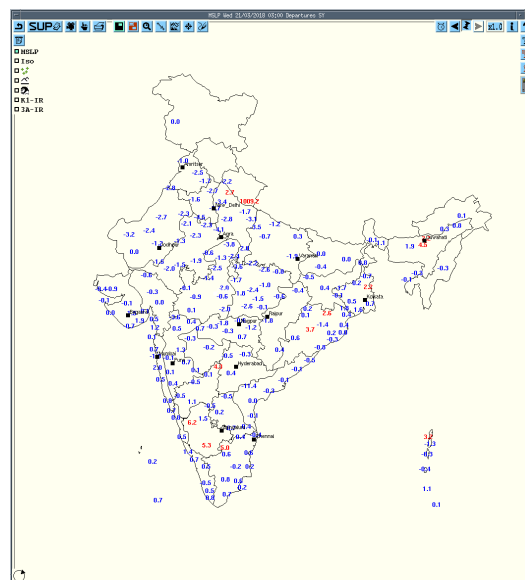
Departure Tmax



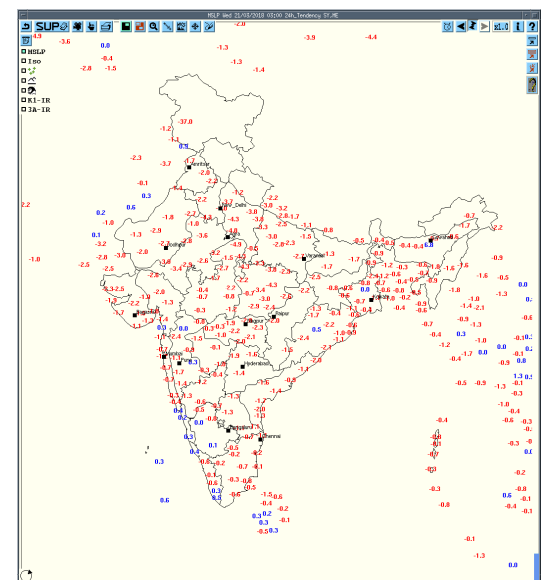
Tendency Tmax



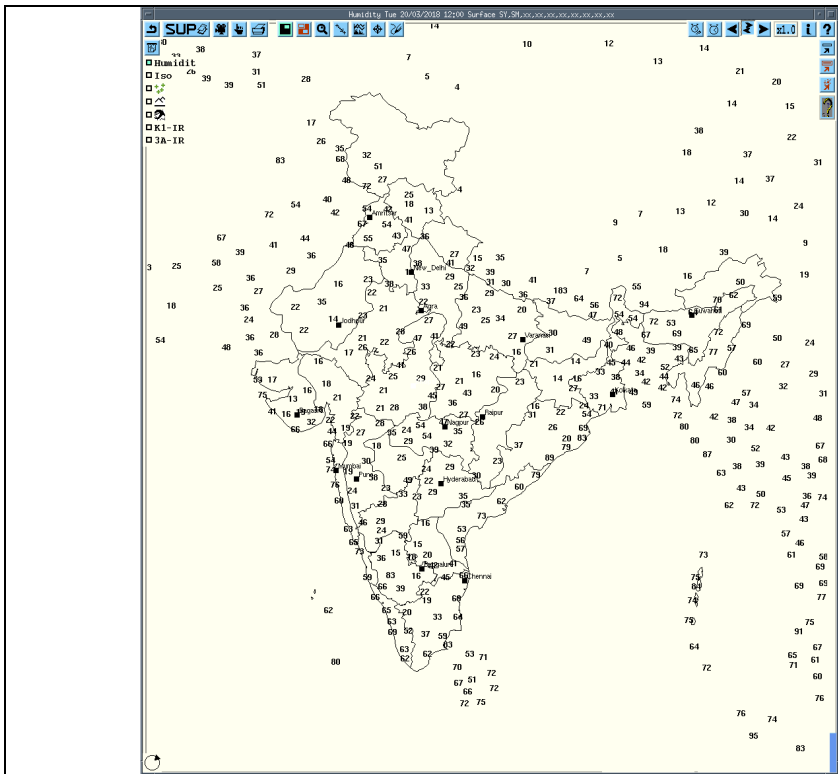
MSLP



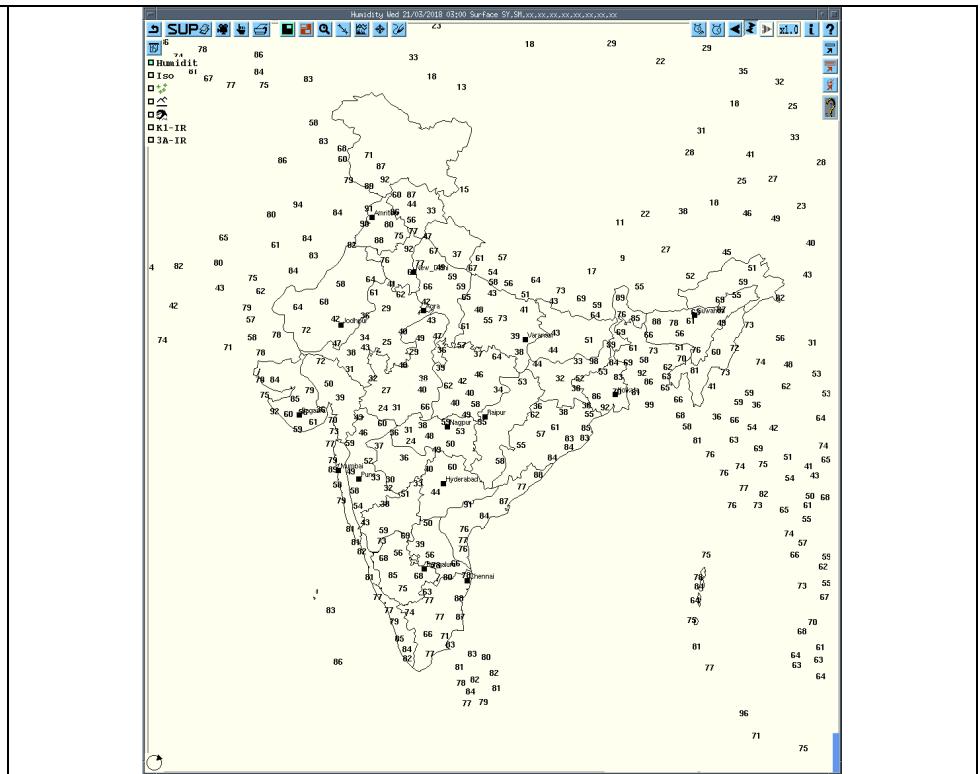
Departure MSLP



Tendency MSLP



RH at 12UTC yesterday



RH at 03UTC today

Past 24 hours DWR Report:

DWR Station Name	Date of Report	Time Interval of Observation (UTC)	Organisation of cells (Isolated single cells/multiple cells/convective regions /squall lines) with height of 20 dBZ echo top and maximum reflectivity	Formation w.r.t. radar station and Direction of movement	Remarks	Associated Severe Weather if any	Districts affected
Agartala	21-03-18	200300-210300	--	--	No Significant Echo	--	--
Jaipur	21-03-18	200302- 200512	Multiple cell with average height 3.5 km and maximum reflectivity 42.0 dBZ	Multiple cell develop from 0302 UTC of 20/03/2018 in W,NW of Jaipur and moved NE wards at speed 25-30 km/hr	Cell starts forming from 0302 UTC of 20.03.2018 in W,NW of Jaipur and reaches maximum reflectivity during 0312- 0412 UTC of 20/03/2018 and died down at 0512 UTC of 20/03/2018	Thunderstorm/rain at Isolated places	Sikar, Jaipur, Jhunjhunu Districts
		201152-201642	Multiple cell with average height 4.0 km and maximum reflectivity 34.0 dBZ	Multiple cell develop from 1152 UTC of 20/03/2018 in E,NE of Jaipur and moved NE wards at speed 20-25 km/hr	Cell starts forming from 1152 UTC of 20.03.2018 in E,NE of Jaipur and reaches maximum reflectivity during 1252- 1602 UTC of 20/03/2018 and Cells died down at 1642 UTC of 20/03/2018	Thunderstorm/rain at Isolated places	Jaipur, Dausa Alwar, Sikar Districts
Lucknow	21-03-18	200300-210300	Nil	Nil	Nil	Nil	Nil
Patiala		200300-200900	Nil	Nil	Nil	Nil	Nil
		200900-201200	Multiple Echoes Dbz =47.0 Ht 7-10 Km	Formation In NW, SW Sectors. Movement Towards Ne Direction			Amritsar, Faridkot, Muktsar, Mansa, Patiala, Jalandhar, Ferozpur, Rewari, Elanbad
		201200 - 201500	Multiple Echoes Dbz =52.0 Ht 8-10 Km	Formation In NW, SSSE Sectors. Movement Towards Ne Direction			Amritsar, Ferozpur, Faridkot, Moga, Zira, Jalandhar, Patiala, Barnala, Elanabad, Nahar
		20/1500 -201800	Multiple Echoes Dbz =46.0 Ht 9-10 Km	Formation In NW, SW Sectors. Movement Towards Ne Direction			Zira, Faridkot, Moga, Fathebad, Barnala, Amritsar
		201800 - 202100	Multiple Echoes Dbz =53.0 Ht 9-10 Km	Formation In Ne, SW Sectors. Movement Towards Ne Direction		Light Rain Patiala	Patiala, Pehowa, Amritsar, Ludhiana, Chandigarh
		20 2100- 210000	Multiple Echoes Dbz =53.0 Ht 9-10 Km	Formation In NW, Se Sectors. Movement Towards Ne Direction			Jalandhar. Amritsar, Panipat, Pehowa, Karnal, Ludhiana, Ambala, Chandigarh
		210000-210252	Multiple Echos Dbz =55.0 Ht 12-13 Km	Formation In NE, NW and SE Sectors. Movement Towards Ne Direction			Nawanshahar Adampur, Amritsar, Jalandhar, Saharnpur, Karnal
Kolkata	21-03-18	200302-210301	--	--	No Significant Echo	--	--
Visakhapatnam	21-03-18	210000-210300	CB cell Sly with max reflectivity 45 dBZ and height 6kms	155km towards S	Likely to be dissipated	NIL	NIL

Realised past 24hrs TS/SQ/HS Data:

Realised TS/HS/SQ during past 24 hours ending at 0300UTC of today(received from RMCs/MCs)						
Name of Station Reporting	Region	State/Sub Division	Weather Event (TS/Hail/Squall)	Date	Time of Commencement (IST)	Time of end (IST)
Ambala	Northwest India	Haryana	Thunderstorm	21-03-18	0040	0150
Hisar	Northwest India	Haryana	Thunderstorm	20-03-18	2032 2115	2040 2210
Karnal	Northwest India	Haryana	Thunderstorm	21-03-18	Early morning	
Patiala	Northwest India	Punjab	Thunderstorm	21-03-18	0125	0135
Amritsar	Northwest India	Punjab	Thunderstorm	20-03-18 21-03-18	1852 0315	2232 0630
Ludhiana	Northwest India	Punjab	Thunderstorm	20/21-03-18	During Night	
Chandigarh	Northwest India	Chandigarh	Thunderstorm	21-03-18	0330	0400
Batote	Northwest India	Jammu & Kashmir	Thunderstorm	21-03-18	0430	0500
Bhaderwah	Northwest India	Jammu & Kashmir	Thunderstorm	21-03-18	0350	0750
Muzaffarnagar	Northwest India	West Uttara Pradesh	Thunderstorm	21-03-18	0500	0700
Ganganagar	Northwest India	West Rajasthan	Thunderstorm	21-03-18	202250 210410	210020 210700
Shimla	Northwest India	Himachal Pradesh	Thunderstorm	21-03-18	210805	0830
Dehradun	Northwest India	Uttarakhand	Thunderstorm	21-03-18	0630	0830

IMPORTANT LINKS:

For NCMRWF NWP products:(<http://www.ncmrwf.gov.in/HomePage/NEPS-prod-1.php>)

For IMD NWP products:(http://nwp.imd.gov.in/diagpro_new.php)

For Synoptic plotted data and charts

<http://amssdelhi.gov.in/>

<http://www.amsskolkata.gov.in/>

For RANDHRA PRADESHID tool:

http://rAndhra_Pradeshid.imd.gov.in/

Low Level Winds

http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/LLW/MAR_2017/?C=M;O=D

Upper level winds

http://satellite.imd.gov.in/archive/INSAT-3D-IMAGER/3D-PRODUCTS/AMV/HLW/MAR_2017/?C=M;O=D

Past24hourHEMandIMRrainfall(upto03UTCoftoday)

IMR: http://satellite.imd.gov.in/img/3Ddaily_imr.jpg

HEM: http://satellite.imd.gov.in/img/3Ddaily_he.jpg

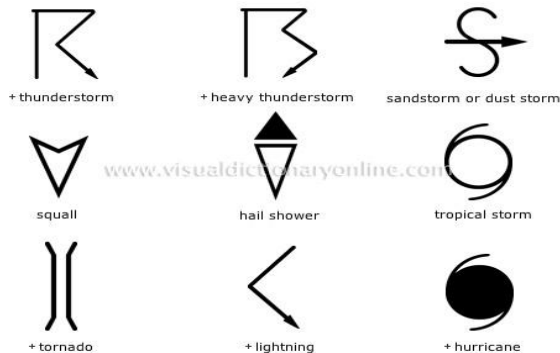
ForRadarimagesofthepast24hoursincludingmosaicofimages:











http://ddgmui.imd.gov.in/dwr_img/

Satellite sounder based T- Phigram

http://satellite.imd.gov.in/mAndhra_Pradesh_skm2.html

WEATHER SYMBOLS:



	haze
	smoke
	dust or sand storm
	fog
	drizzle
	rain
	snow
	showers
	hail
	thunderstorm
Weather Symbols	