



# India Meteorological Department

## **FDP STORM Bulletin No. 55 (30-04-2018)**

### **1. CURRENT SYNOPTIC SITUATION:**

#### **NWFC INFERENCE (0300UTC of the Day):**

- ◆ Western Disturbance as a cyclonic circulation over northwest Iran and neighbourhood now lies over Iran and neighbourhood between 3.1 km and 7.6 km above mean sea level.
- ◆ The east west trough now runs from Punjab to southeast Madhya Pradesh across Haryana and west Madhya Pradesh and extends upto 0.9 km above mean sea level.
- ◆ The cyclonic circulation over Madhya Pradesh and adjoining Chhattisgarh has merged with the above trough.
- ◆ The cyclonic circulation over east Bihar & adjoining West Bengal Jharkhand extending upto 2.1 km above mean level persists.
- ◆ A trough runs from the above cyclonic circulation to Manipur across Meghalaya and extends upto 1.5 km above mean sea level.
- ◆ The north south wind discontinuity from east Vidarbha to interior Tamilnadu now runs from Telangana to south Tamilnadu across Rayalaseema and South Interior Karnataka and extends upto 0.9 km above mean sea level.
- ◆ The low pressure area over Andaman Sea & neighbourhood with associated cyclonic circulation extending upto 3.1 km above mean sea level persists.

#### **SATELLITE OBSERVATIONS during past 24 hrs and current observation:**

##### **Current Observation (based on 0900UTC imagery of INSAT 3D):**

##### **Intense Precipitation Advisory for next 3 hrs:**

Heavy rainfall spell (>15mm/hr) is likely over extreme Nagaland, Manipur, Tripura and Mizoram. Moderate rainfall spell (>5mm/hr) is likely over West Central Jharkhand, Meghalaya and Assam

(For details kindly refer to <http://sigma.cptec.inpe.br/scope/>).

##### **Thunderstorm Advisory for Next 3 Hrs:**

Thunderstorm/Convective cells over North Uttarakhand, West Central Odisha, Assam, Meghalaya, Nagaland, Manipur, Tripura and Mizoram.

(For details kindly refer to <http://www.rapid.imd.gov.in/>).

##### **Low Level Circulation (LLC) over Andaman Sea:**

Scattered multi-layered clouds with embedded intense to very intense convection seen over Andaman Sea (**Minimum CTT Minus 93 DEG C**) in association with Low Level Circulation over the area.

##### **Western Disturbance (WD):**

Scattered multi-layered clouds seen over Tibet adjoining China in association with Western Disturbance over the area.

Scattered multi-layered clouds seen over Iran & neighbourhood in association with another Western Disturbance over the area.

**Clouds descriptions within India:**

Scattered low/medium clouds with embedded isolated weak to moderate convection seen over Jammu & Kashmir, Northeast Himachal Pradesh, North Uttarakhand, Delhi, Uttar Pradesh, Madhya Pradesh, East Rajasthan and North Vidarbha,

Scattered low/medium clouds with embedded moderate to intense convection seen over West Central Jharkhand, Assam, Meghalaya, Nagaland, Manipur, Tripura and Mizoram, Sikkim, West Arunachal Pradesh and Nicobar Islands.

**Arabian Sea:-**

No Significant Clouds over the Region.

**Bay of Bengal & Andaman Sea:**

Scattered low/medium clouds with embedded intense to very intense convective seen over Andaman Sea in association with Low Level Circulation over the area.

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

Moderate to Intense convection was observed over Uttarakhand Haryana Delhi Uttar Pradesh North Madhya Pradesh North Bihar Jharkhand Odisha West Bengal Sikkim North-East States North Interior Karnataka South Kerala Andaman & Nicobar islands.

**OLR:**

Up-to 230  $\text{wm}^{-2}$  observed over North East states South East Uttar Pradesh Adjoining Madhya Pradesh South East Orissa South Kerala North Parts of South Interior Karnataka.

**Synoptic Features:**

Westerly Trough & Jet Stream are not observed over Indian region.

**Dynamic Features:**

Up to 30- 40 knots **wind shear** is observed over North India, Central India & North-East India and 15-20 knots over south peninsula India.

Positive **wind Shear tendency** is observed over the country

Negative **Low Level Convergence** is observed over East Gujarat adjoining Maharashtra.

Positive **Vorticity (850 hPa)** is observed over Punjab Haryana Delhi Uttar Pradesh Uttarakhand Bihar Orissa.

**Precipitation:****IMR:**

Rainfall up-to 20-50 mm observed over North East Orissa adjoining Jharkhand South Kerala South parts of North Interior Karnataka North Bihar Central GWB.

Rainfall up-to 01-20 mm observed over Haryana Uttar Pradesh Delhi North East States

**RADAR and RAPID RGB Observation:**

Multiple significant squall line was seen on DWR Agartala (dBZ > 50, height>10km), domains at around 1200IST.

RAPID RGB Satellite imagery at 1500IST indicates significant convection over Himachal Pradesh, Uttarakhand, Jharkhand, West Arunachal Pradesh, Assam, East Meghalaya, Nagaland, Manipur, Tripura, Mizoram, Madhya Pradesh, North Chhattisgarh and Nicobar Islands.

### Environmental Condition (dust etc) and its Forecast based on 00UTC of date:

Higher Dust concentration was observed over northern Africa, Arab countries and western part of India. Dust concentration is expected to decrease slightly over IGP and north India.

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

<b>Delhi – SAFAR analysis &amp; Forecast</b>	30.04.2018	01.05.2018
PM10 (micro-g/m <sup>3</sup> )	218	239
PM2.5 (micro-g/m <sup>3</sup> )	85	94

## **2. NWP MODEL GUIDANCE:**

### NCMRWF (NCUM forecast based on 00UTC the day):

#### **1. Weather Systems:**

##### **Low level Cycirs, Troughs:**

**12UTC of Day 0-1:** Heat low over Pakistan and adjoining west Rajasthan and trough in MSLP from Rajasthan to Chhattisgarh

**00UTC of Day 1-4:** 850 hPa N-S trough from central to southern peninsular India

**00UTC of Day 1-2:** 850 hPa east-west trough from Punjab to southern U.P and adjoin M.P. In Day 3-4 a CYCIR over Punjab. In Day 3 another CYCIR over Bihar/Jharkhand and in Day 4 over W.B and Bangladesh

**Confluence & Wind Discontinuity Regions: 12 UTC of Day 0-3:** 925 hPa N-S discontinuity over Southern Peninsular India

**Synoptic Systems: 00 UTC of Day 3: 00 UTC of Day 2:** Fresh WD approaching J &K and western Himalayan region.

**00UTC of Day 1-5:** 925 hPa Strong Southwesterlies from Bay of Bengal leading moisture incursion along Odisha coast and over Bangladesh and east northeast India

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

#### **3. Convergence at 850 hPa:**

##### **Day/Index: Subdivisions with Lower Level Convergence > 15 x 10<sup>-5</sup> /s**

Day0: Gangetic WB, Jharkhand, West UP, West RJ, East RJ, Odisha, West MP, East MP, Madhya Maharashtra, Marathwada, Coastal AP, Telangana, Tamilnadu, Puducherry, NI Karnataka, SI Karnataka,

Day1: Jammu Kashmir, Odisha, Madhya Maharashtra, Chhattisgarh, NI Karnataka, SI Karnataka,

Day2: Jharkhand, Haryana, Chandigarh, Delhi, Jammu Kashmir, West RJ, East RJ, Odisha, West MP, East MP, Madhya Maharashtra, Marathwada, Chhattisgarh, NI Karnataka, SI Karnataka,

Day3: Haryana, Chandigarh, Delhi, Punjab, West RJ, Odisha, West MP, East MP, Madhya Maharashtra, Marathwada, Vidarbha, NI Karnataka,

Day4: Assam Meghalaya, NE NMMT, Jharkhand, East MP, Madhya Maharashtra, Vidarbha, Chhattisgarh, NI Karnataka, SI Karnataka, Kerala

#### **4. Low level Vorticity:-Positive Vorticity:**

##### **Day/Index: Subdivisions with Lower Level Vortex > 15 x 10<sup>-5</sup> /s**

Day0: Assam Meghalaya, Jharkhand, Bihar, East UP, West UP, West RJ, East RJ, Odisha, West MP, Chhattisgarh,

Day1: Jharkhand, Bihar, East UP, Odisha, East MP,

Day2: Assam Meghalaya, NE NMMT, Jharkhand, Haryana, Chandigarh, Delhi, West RJ, Tamilnadu, Puducherry,

Day3: Gangetic WB, Haryana, Chandigarh, Delhi, Punjab, West RJ, West MP, Saurashtra Kutch, Madhya Maharashtra,

Day4: Assam Meghalaya, Jharkhand, Madhya Maharashtra

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

#### **Day/Index: Subdivisions with Showalter Index < -4**

Day0: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Himachal Pradesh, Jammu Kashmir, Odisha, East MP, Konkan Goa, Coastal AP, Telangana, Rayalaseema , Tamilnadu, Puducherry, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day1: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Himachal Pradesh, Jammu Kashmir, East RJ, Odisha, West MP, East MP, Chhattisgarh, Coastal AP, Telangana, Tamilnadu, Puducherry, Coastal Karnataka, SI Karnataka, Kerala,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, East RJ, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema , Tamilnadu, Puducherry, Coastal Karnataka, SI Karnataka, Kerala,

Day3: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, East RJ, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Tamilnadu, Puducherry, Coastal Karnataka, SI Karnataka, Kerala,

Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha, Vidarbha, Chhattisgarh, Coastal AP, Tamilnadu, Puducherry, Coastal Karnataka, SI Karnataka, Kerala

### **6. Spatial distribution of TTI: TTI >50 [Scattered Thunderstorms few severe]:**

#### **Day/Index: Subdivision with Total Totals Index > 52**

Day0: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West RJ, East RJ, Odisha, West MP, East MP, Saurashtra Kutch, Chhattisgarh, Coastal AP, Rayalaseema , Tamilnadu, Puducherry,

Day1: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West RJ, East RJ, Odisha, West MP, East MP, Chhattisgarh, Coastal AP, Telangana,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West RJ, East RJ, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana,

Day3: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West RJ, East RJ, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana,

Day4: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West RJ, Odisha, East MP, Vidarbha, Chhattisgarh, Telangana, Tamilnadu, Puducherry, SI Karnataka

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

### Day/Index: Subdivisions with K Index > 40

Day0: Arunachal Pradesh, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Himachal Pradesh, Odisha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu, Puducherry, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day1: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, East UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha, East MP, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu, Puducherry, SI Karnataka, Kerala,

Day2: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, East RJ, Odisha, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu, Puducherry, SI Karnataka, Kerala,

Day3: Arunachal Pradesh, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, West UP, Uttarakhand, Punjab, Jammu Kashmir, East RJ, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu, Puducherry, SI Karnataka, Kerala,

Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha, East MP, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu, Puducherry, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala

## 8. Rainfall and thunder storm activity:

### Day/Index: Subdivisions with Precipitation > 2 cm

Day1: Arunachal Pradesh, Assam Meghalaya, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Odisha, Tamilnadu, Puducherry, SI Karnataka, Kerala,

Day2: Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, Uttarakhand, Odisha, Andaman Nicobar, Coastal AP,

Day3: Assam Meghalaya, NE NMMT, Gangetic WB, Jharkhand, Bihar, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, Odisha, Chhattisgarh,

Day4: Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Jammu Kashmir, Odisha, Chhattisgarh,

Day5: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Gangetic WB

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

#### 1. Synoptic Systems:

The analysis based on 00 UTC indicates an East- West oriented Trough extends from Punjab to South East Madhya Pradesh. Across Haryana and Haryana and west Madhya Pradesh in lower Troposphere (925 hPa). The Forecast shows that it will persist till day3. The forecast shows a cyclonic circulation over North West Rajasthan and adjoining areas on day 1. It will persist till day3. The analysis shows a cyclonic circulation over East Bihar and Adjoining Jharkhand region in lower Troposphere. A Trough extends from this cyclonic circulation up to Manipur across Meghalaya. The analysis shows a North- South Trough extends from Telangana to south Tamil Nadu across Rayalaseema. The forecast shows it will persist for next 48 hours.

**2. Location of Jet and Jet Core (>60kt) at 500hPa:** Although the presence of strong westerlies is found over Eastern parts of India but no jet core over the Indian region for the next 3 days.

**3. Low Level Vorticity {850hPa Positive Vorticity ( $>12 \times 10^{-1}/s$ ):** Low level Positive Vorticity is seen mostly along the North- South Trough, the trough from Punjab to Madhya Pradesh, along the cyclonic circulations, over parts of GWB, Orissa, Bihar, Jharkhand and NE states 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 ( $> 3$ ):** The threshold value of the index  $> 3$  is seen over parts of Punjab, Himachal Pradesh, Uttarakhand, Haryana and Delhi, Gujarat, coastal areas of Gangetic West Bengal and Kolkata, SHWB parts of Orissa, Bihar, Jharkhand, Uttarakhand, Uttar Pradesh, Rajasthan, Andhra Pradesh, Telangana, Rayalaseema, Kerala, Karnataka Konkan and Goa, Tamil Nadu, coastal Maharashtra including Mumbai, Konkan & Goa, Vidarbha, Madhya Maharashtra, Madhya Pradesh, Chhattisgarh, coastal areas along the east coast and west coast, Sikkim, Assam, Meghalaya, Tripura and adjoining area during next 3 days; Maximum value of the index is seen over parts of GWB, SHWB, Orissa, Bihar, Jharkhand, Uttar Pradesh, Chhattisgarh, Telangana, Gujarat, Rajasthan, Punjab, Haryana, Delhi, Madhya Pradesh, Vidarbha, Andhra Pradesh, coastal Maharashtra, coastal Karnataka, Kerala and coastal Tamil Nadu on all 3 days; over parts of Uttarakhand on day 1 and 2.

**Lifted Index ( $< -2$ ):** The threshold value of the index is below  $-2$  over parts of Gujarat, Rajasthan, Punjab, Haryana, Delhi, Uttar Pradesh, Himachal Pradesh, Uttarakhand, Madhya Pradesh, Bihar, Jharkhand, Andhra Pradesh, Karnataka, Telangana, Rayalaseema, Konkan and Goa, Kerala, Tamil Nadu, southern part of west coast, coastal areas along the east coast, Chhattisgarh, Vidarbha, Orissa, GWB, SHWB, Sikkim and NE states on all 3 days; maximum negative value of the index less than  $-10$  is seen over parts of GWB, Orissa and coastal Andhra Pradesh during next 3 days. Over parts of Jharkhand on day 2 and 3; over some parts of Telangana on day 3.

**Total Total Index ( $> 50$ ):** The threshold value of the index is  $> 50$  is seen over most of the parts of the country except Gujarat, Madhya Maharashtra, north west Marathwada, extreme south peninsular India and coastal areas along the west coast during next 3 days; the maximum value of the index  $>60$  is seen over parts of Bihar, GWB, East Uttar Pradesh, Jharkhand and Orissa on day 2; over parts of Orissa, GWB and Jharkhand on day 3.

**Sweat Index ( $> 300$ ):** Although the threshold value of the Index  $>300$  is seen in most parts of the country except central parts of Madhya Maharashtra, some parts of Marathwada and west Vidarbha during next 3 days; maximum value of the index greater than 800 is seen over parts of GWB, SHWB, Orissa, Jharkhand, North Chhattisgarh, Andhra Pradesh and some parts of south west Uttar Pradesh on day 1 and 3; over parts of Bihar, GWB, Jharkhand and Orissa on day 2; over some parts of East Uttar Pradesh on day 3.

**CAPE ( $> 1000$ ):** Mostly seen over Punjab, Haryana, Delhi, Rajasthan, Himachal Pradesh, Uttarakhand, Uttar Pradesh, southern peninsular India, along west coast and east coast, parts of Orissa, Andhra Pradesh, Telangana, Rayalaseema, Kerala, Tamil Nadu, Karnataka, coastal Maharashtra including Mumbai, Gujarat, Konkan and Goa, Bihar, Jharkhand, Chhattisgarh, GWB, SHWB, Sikkim, Assam, Meghalaya, Tripura and adjoining areas during next 3 days; over parts of West Madhya Pradesh on day 1; Maximum value of the index greater than 2500 is seen mostly over parts of Gujarat, GWB, coastal Orissa, coastal Andhra Pradesh, Coastal Tamil Nadu, Coastal Kerala, Jharkhand, Chhattisgarh, Telangana during next 3 days; over parts of Vidarbha and adjoining East Madhya Pradesh on day 1; over parts of Bihar, adjoining East Uttar Pradesh on day 2; over parts of Haryana, Delhi and adjoining areas, west Uttar Pradesh, Bihar, East Uttar Pradesh, Vidarbha and adjoining areas on day 3.

**CIN (50-150):** Although the threshold value of the Index lies in the range of (50–150) over most part of the country except central parts of Madhya Pradesh, northern parts of Madhya Maharashtra, Marathwada, and West Vidarbha region during next 3 days; maximum value of the index greater than 400 is seen over parts of Gujarat, Rajasthan, Uttar Pradesh, west Madhya Pradesh, Bihar, Chhattisgarh, Punjab, Haryana, Himachal Pradesh, Uttarakhand, coastal Maharashtra, Andhra Pradesh, Orissa and North Interior Karnataka on day 1; over parts of Gujarat, west Rajasthan, west Uttar Pradesh, East Madhya Pradesh, coastal Maharashtra, Jharkhand, Orissa, GWB and Chhattisgarh on day 2; over parts of GWB, Orissa, Jharkhand, Gujarat, West Rajasthan, West Madhya Pradesh, Chhattisgarh, south Madhya Maharashtra, coastal Maharashtra, north interior Karnataka, Punjab, Haryana, Delhi, Himachal Pradesh and adjoining areas on day 3.

## 5. Rainfall Activity:

Above 130 mm Rainfall: over parts Of Orissa and adjoining areas on day 2.

70- 130 mm Rainfall: over parts of GWB and Kolkata on day 1 and 2: over parts of Jharkhand on day 2; over parts of Orissa and adjoining areas on day 2 and 3.

40- 70 mm Rainfall: over parts of South Karnataka on day 1; over parts of GWB, and Orissa during next 3 days; over parts of, Jharkhand on day 1 and 2.

10- 40 mm Rainfall: over parts of Himachal Pradesh, Uttarakhand, Sikkim, NE states, Foothills of Himalaya, Bihar, Jharkhand, GWB, SHWB, Orissa, Kerala, Karnataka and Tamil Nadu during next 3 days; over parts of J&K, Punjab, Haryana and West Uttar Pradesh on day 3; over some parts of East Uttar Pradesh on day 1.

Up to 10 mm rainfall: Over parts of J&K, Foothills of Himalaya, Himachal Pradesh, Uttarakhand, Punjab, Haryana and adjoining areas, Rajasthan, Uttar Pradesh, Sikkim, NE states, GWB, SHWB, Orissa, Madhya Pradesh, Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, Bihar, Jharkhand, Chhattisgarh, Telangana, Rayalaseema, Vidharbha, Konkan and Goa during next 3 days; over some parts of Haryana, Delhi and adjoining areas on day 3.

### IMD WRF (9km based on 00UTC of the day):

#### 1. Model Reflectivity (Max. dBZ):

**> 25 dBZ Model Reflectivity:** Over parts of GWB, Sikkim, Orissa, Bihar, Jharkhand, East Uttar Pradesh, SHWB, Andhra Pradesh, Kerala, Tamil Nadu, North west and East Madhya Pradesh and adjoining Uttar Pradesh, North Chhattisgarh and NE states on day 1; over parts of J&K, North west Rajasthan, adjoining Punjab, East Madhya Pradesh, Tamil Nadu, Chhattisgarh, Orissa, GWB, Bihar, Jharkhand, SHWB, Sikkim and NE states on day 2; over parts of J&K, Punjab, Rajasthan, Himachal Pradesh, Uttarakhand, Haryana, Delhi, Uttar Pradesh, GWB, Orissa, Bihar, Jharkhand, Sikkim, SHWB, NE states, Tamil Nadu, Chhattisgarh, Telangana and adjoining areas on day 3; maximum value of the Model reflectivity is seen over parts of GWB, SHWB, Orissa, Bihar, Jharkhand, East Uttar Pradesh, Andhra Pradesh, Sikkim and NE states during next 3 days; over parts of Punjab, North West Rajasthan, Haryana, Delhi, Uttarakhand, Himachal Pradesh and West Uttar Pradesh on day 3.

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

**Total Index (> 50):** Above threshold value is observed over most parts of the country except extreme south peninsular India, extreme southern parts of west coast and the east coast, southern parts of Karnataka, coastal Maharashtra, Konkan and Goa, Kerala, Andhra Pradesh, Tamil Nadu, Bihar, Jharkhand, Orissa, GWB, SHWB, NE states and East Uttar Pradesh during the next 3 days; below threshold value is seen over parts of Madhya Maharashtra, West Uttar Pradesh, Orissa, Andhra Pradesh and Uttarakhand on day 1; over some parts of Chhattisgarh, Orissa, West Uttar Pradesh, Uttarakhand and Andhra Pradesh on day 2; over parts of West Uttar Pradesh, Uttarakhand, Orissa and Andhra Pradesh; the maximum value of the index is seen over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Rajasthan, Madhya Pradesh, Uttar Pradesh, GWB, Orissa, Madhya Maharashtra, Marathwada, Vidharbha, Bihar, Jharkhand, Telangana, Chhattisgarh, Karnataka and Gujarat during next 3 days.

**K-Index (> 35):** Less than threshold value is observed over most of the part of the country during the next 3 days.

**CAPE (> 1500):** Greater than threshold value over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab Haryana, Delhi, Rajasthan, Gujarat, coastal areas of west coast, coastal Maharashtra, Konkan & Goa, coastal areas along the east coast, Bihar, Jharkhand, Uttar Pradesh, East and North west Madhya Pradesh, Chhattisgarh, Vidharbha, Orissa, GWB and Kolkata, SHWB, Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Telangana, Rayalaseema, Extreme south peninsular India, Assam, Meghalaya, Tripura and adjoining areas on all 3 days; Maximum value of the index greater than 3500 is seen over the parts of GWB, Orissa, Jharkhand, Andhra Pradesh, coastal Tamil Nadu, Kerala, Chhattisgarh, Telangana, Vidarbha, Karnataka, Konkan and Goa, Gujarat and South coastal Maharashtra during next 3 days.

**CIN (50-150):** Although the threshold value of the Index lies in the range of (50–150) over most part of the country except central parts of west Vidarbha, north Madhya Maharashtra and Marathwada during next 3 days; the maximum value of the index > 400 is seen over parts of Gujarat, Rajasthan, Bihar, Jharkhand, GWB, Orissa, Chhattisgarh, Coastal Maharashtra, Vidarbha, Uttar Pradesh, Telangana Madhya Pradesh, Punjab, Haryana, Delhi, J&K, Himachal Pradesh, Uttarakhand, Rajasthan, Madhya Pradesh, Andhra Pradesh, Telangana, North Karnataka, Konkan and Goa during next 3 days; over parts of Jammu and Kashmir on day 2 and 3.

### **3. Rainfall and Thunderstorm Activity:**

70- 130 mm Rainfall: over parts of Bihar, Jharkhand, Orissa, GWB, SHWB, Assam, Meghalaya, Tripura and adjoining areas on day 1; over parts of Orissa, GWB, Tripura and adjoining areas on day 2; over parts of Orissa, Assam, Meghalaya and adjoining areas on day 3.

40- 70 mm Rainfall: over parts of GWB, Orissa, SHWB and NE states during next 3 days; over parts of Bihar, Jharkhand and East Uttar Pradesh on day 1; over some parts of Jharkhand on day 2 and 3.

10- 40 mm Rainfall: over parts of Sikkim, Foothills of Himalaya, GWB, SHWB, Bihar, Jharkhand, Orissa, Andhra Pradesh, Kerala, Tamil Nadu, Karnataka and NE states during next 3 days, over parts of J&K, Punjab, Himachal Pradesh, Uttarakhand, Haryana and adjoining areas, West Uttar Pradesh on day 3.

Up to 10 mm Rainfall: Over parts of J&K, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Kerala, Tamil Nadu, Orissa, Andhra Pradesh, Telangana, Bihar, Jharkhand, Chhattisgarh, East Madhya Pradesh, foothills of Himalaya, GWB, SHWB, Sikkim and NE states during next 3 days; over some parts of Rajasthan, Punjab, Haryana, Delhi and adjoining areas on day 3.

### **3. IOP ADVISORY FOR 24 and 48Hrs:**

#### **Summary and Conclusions:**

o Most thermodynamic indices (T-STORM Initiation Index, TTI Index, K-Index, Lifted Index, CAPE, CINE) from IMD GFS deterministic model indicate high probability of thunderstorm occurrence over the entire Indian region excluding North Interior Karnataka and Maharashtra, on day 1, with the probability increasing over North and east India on day 2. SWEAT index, which also accounts for the wind shear between 850 and 500 hPa levels, indicates a maximum probability of convection over West Bengal, Jharkhand and Odisha on day 1 and increasing on day 2. The 850-200 hPa wind shear maxima indicate high wind shear across the plains of North and Central India on day 1, increasing during the course of the day, and decreasing on day 2.

o Synoptic analysis and NWP models indicate that an east west trough runs from Punjab to southeast Madhya Pradesh in the lower levels. A cyclonic circulation is seen over east Bihar & adjoining West Bengal Jharkhand and a trough runs from the above cyclonic circulation to Manipur in the lower levels. The anticyclone over the Bay of Bengal is in a northward position and is pumping moisture into the region of Gangetic West Bengal. This is likely to result in heavy rainfall over East and Northeast India during the next two days. The east-west trough over North India, is likely to extend the spread of the moisture westwards into Northwest and central India and light thunderstorms/ dust storms are expected over the region during the next two days.

o The north south wind discontinuity from Telangana to south Tamilnadu is also likely to give thunderstorm activity over extreme south peninsular India on day 1 and 2.

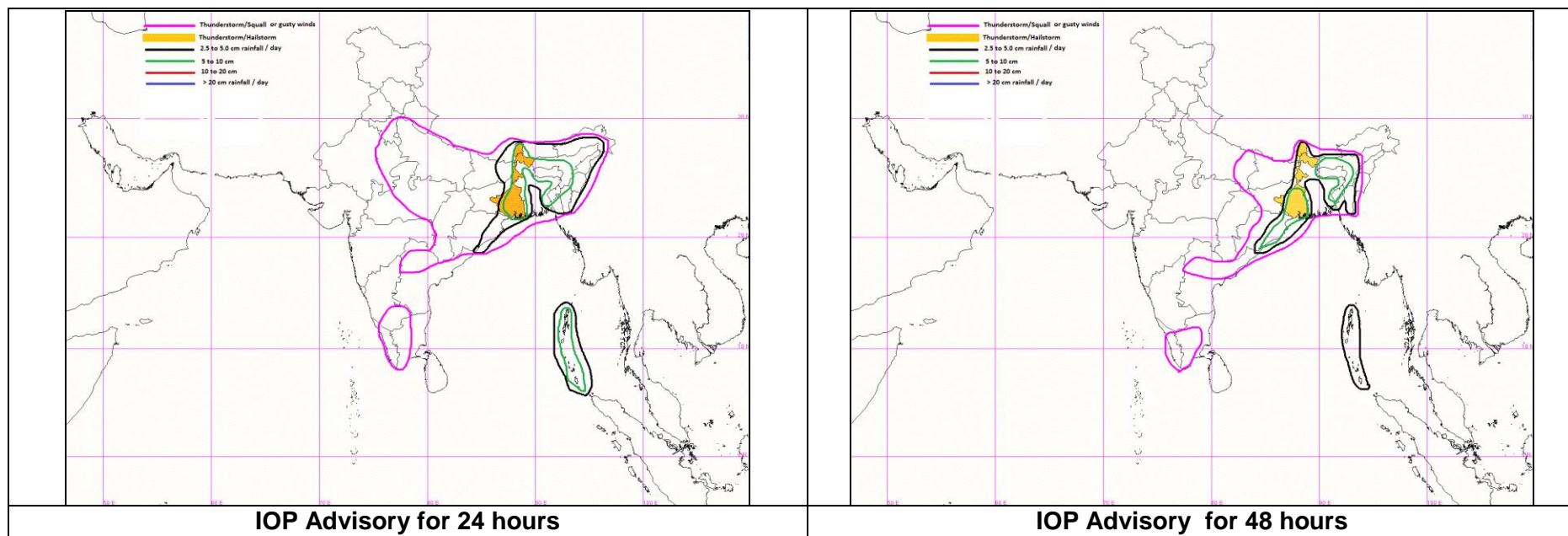
o In association with the low pressure area over Andaman Sea & neighbourhood, heavy rainfall is expected over Andaman and Nicobar Islands on day 1, decreasing on day 2 as the cyclonic circulation shifts northwards.

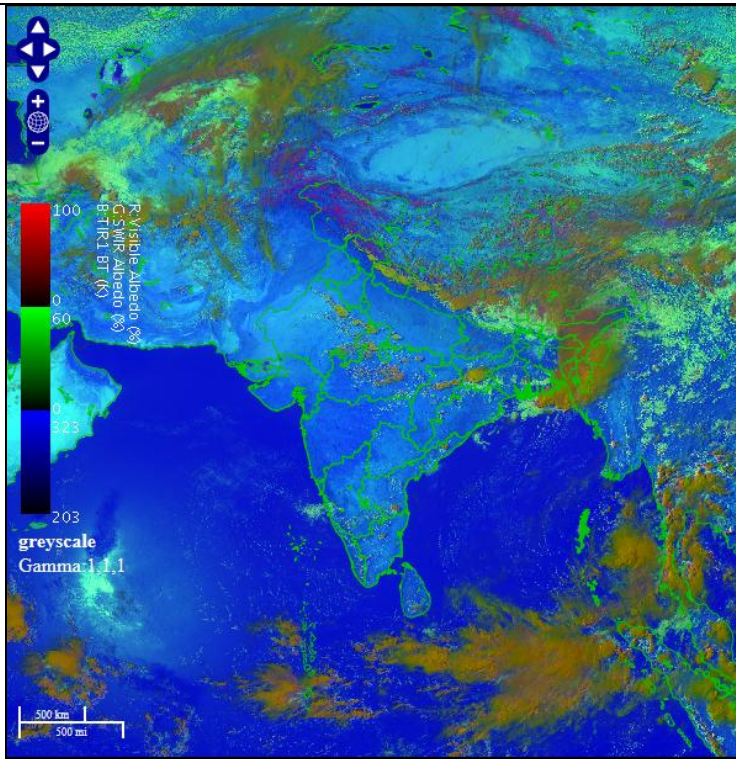


**Day-1 & Day-2:**

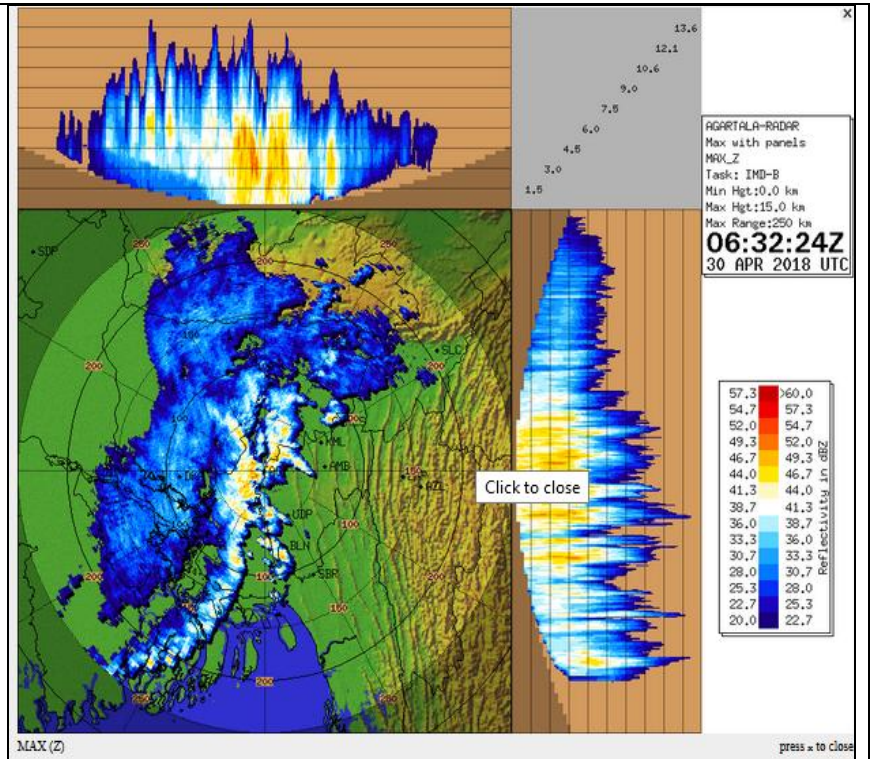
<b>24hour Advisory for IOP:</b>	<b>48hour Advisory for IOP:</b>
<p><b>Significant Rainfall:</b> West Bengal and Sikkim, Odisha, Bihar Nagaland, Manipur, Mizoram, Tripura, Arunachal Pradesh, Assam and Meghalaya Andaman and Nicobar Islands</p> <p><b>Thunderstorm with squall or gusty winds:</b> Interior Tamil Nadu, Kerala, South Interior Karnataka, Telangana, Jharkhand, Bihar, Odisha Madhya Pradesh, Chhattisgarh, Nagaland, Manipur, Mizoram, Tripura, Arunachal Pradesh, Assam and Meghalaya</p> <p><b>Thunderstorm with squall and hail</b> West Bengal, Sikkim</p> <p><b>Thunderstorm and/or Duststrom:</b> Haryana, West Uttar Pradesh, East Rajasthan</p>	<p><b>Significant Rainfall:</b> West Bengal and Sikkim, Odisha, Nagaland, Manipur, Mizoram, Tripura, Assam and Meghalaya Andaman and Nicobar Islands</p> <p><b>Thunderstorm with squall or gusty winds:</b> Interior Tamil Nadu, Kerala, Coastal Andhra Pradesh, Telangana, Jharkhand, Bihar, Odisha Nagaland, Manipur, Mizoram, Tripura, Assam and Meghalaya</p> <p><b>Thunderstorm with squall and hail</b> West Bengal, Sikkim</p> <p><b>Thunderstorm and/or Duststrom:</b> Haryana, West Uttar Pradesh, East Rajasthan</p>

## Graphical Presentation of Potential Areas for Severe Weather:

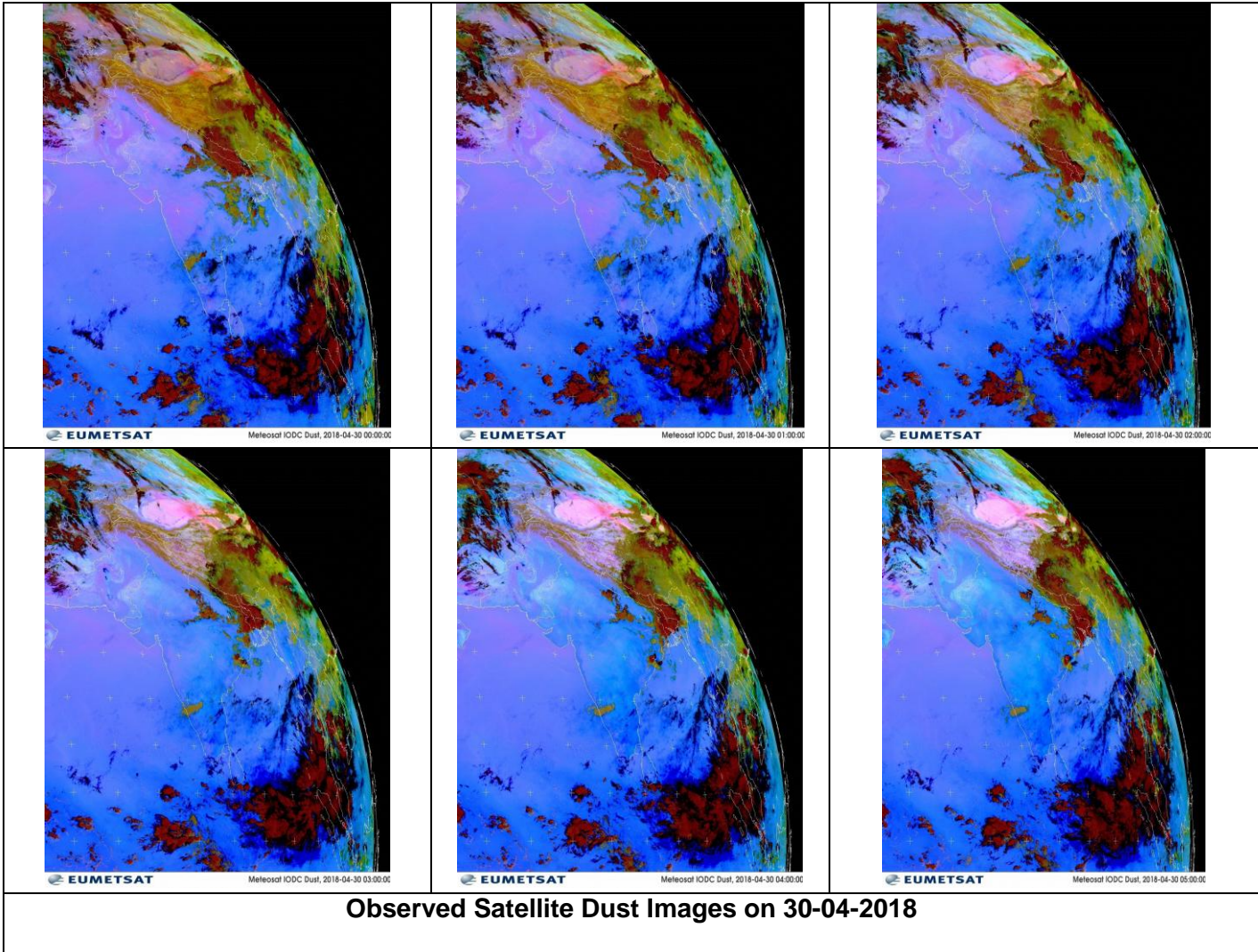


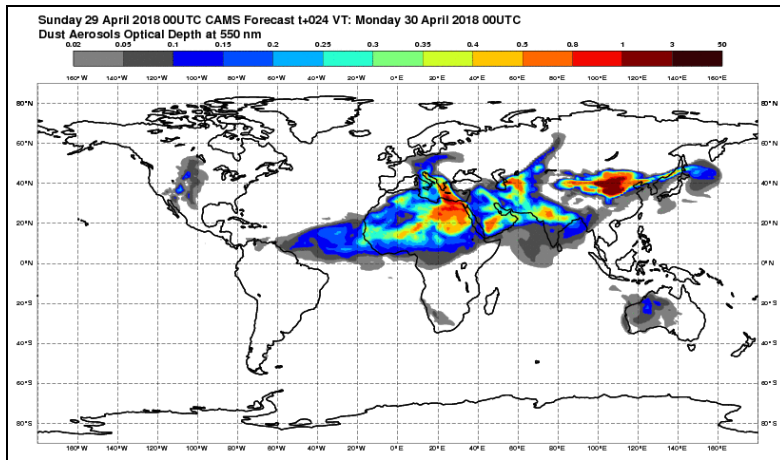


RAPID RGB Imagery at 1500 IST of the Day

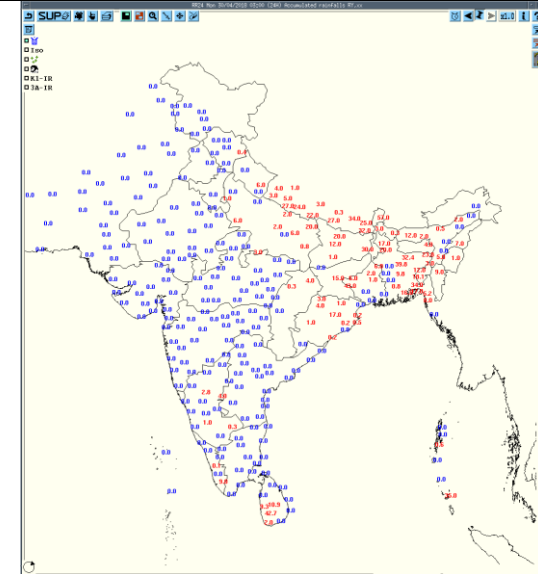


DWR Agartala at 1202IST of the Day

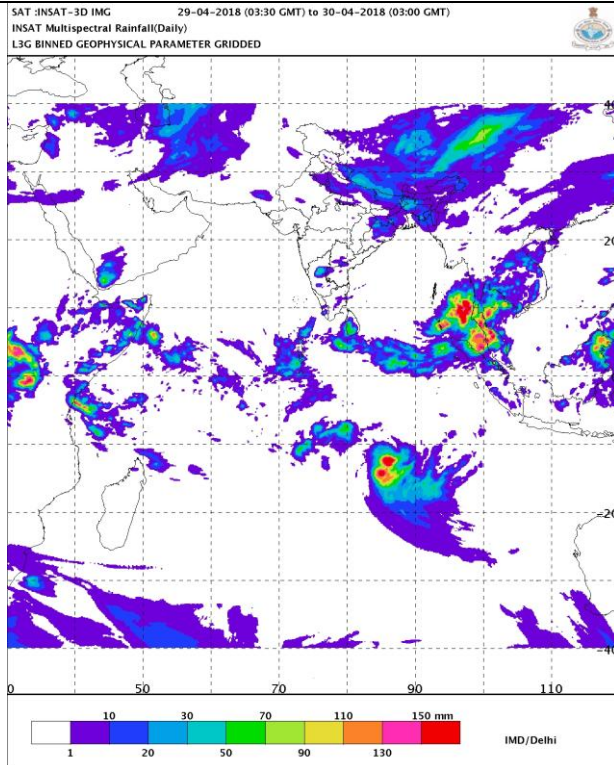




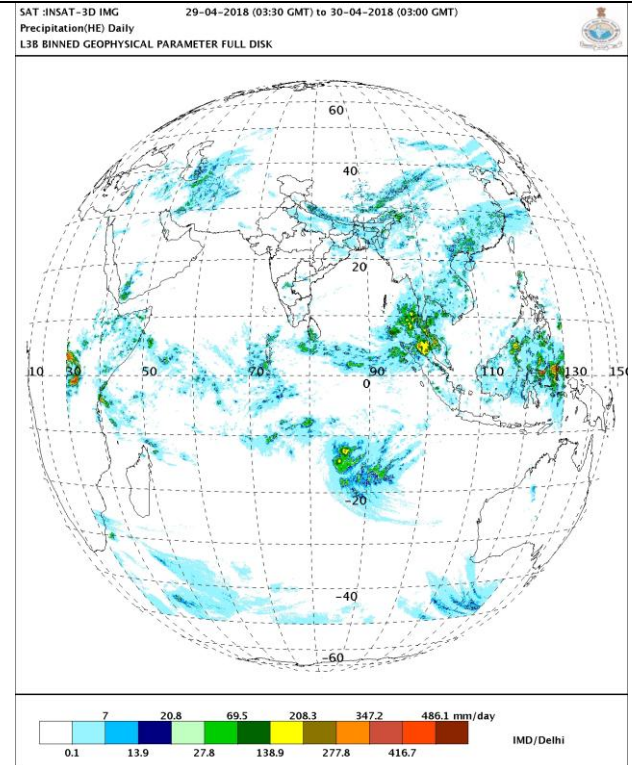
**Dust Forecast**



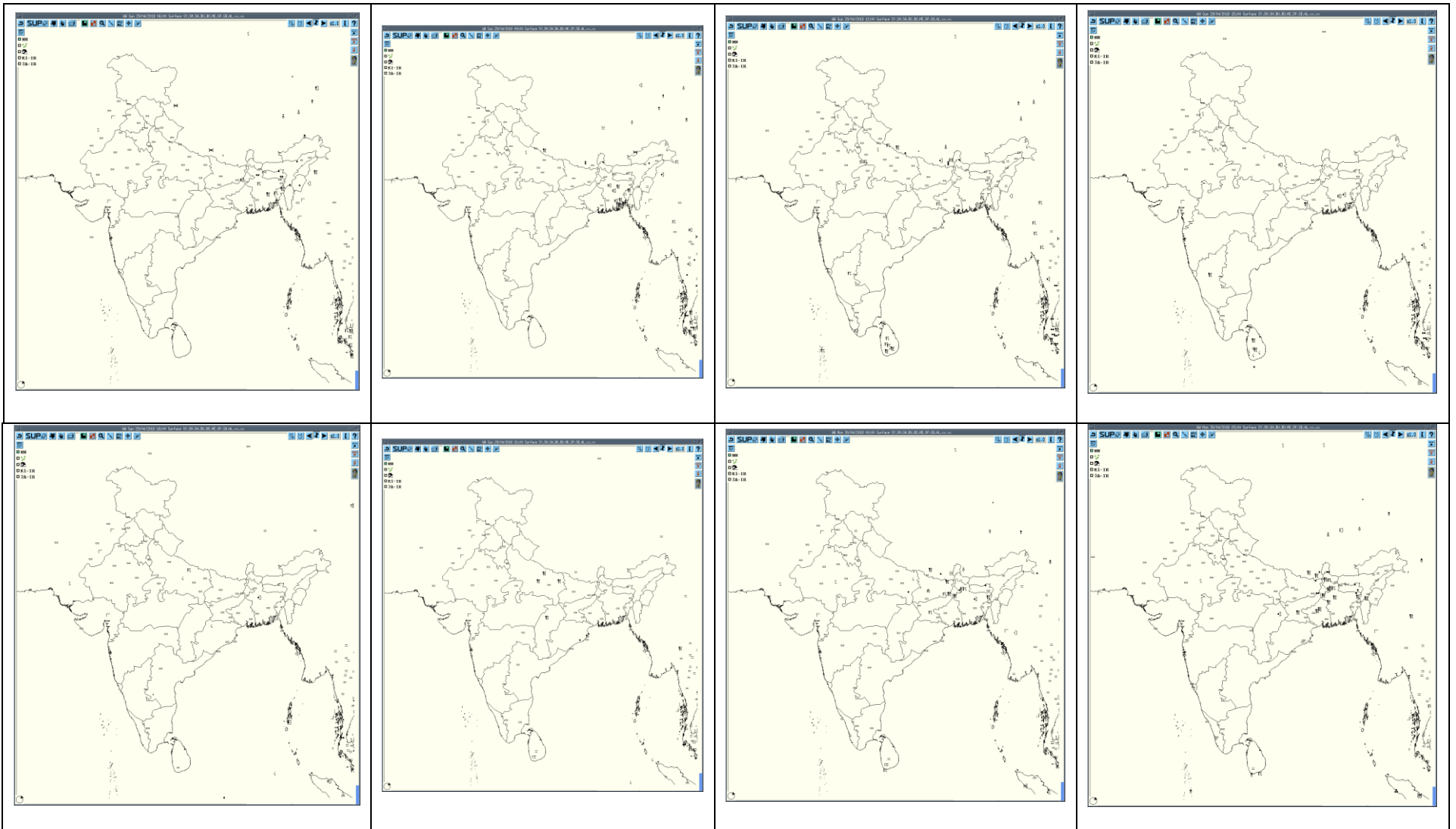
**Accumulated 24 Hour rainfall (in red) recorded at 0300UTC of today**



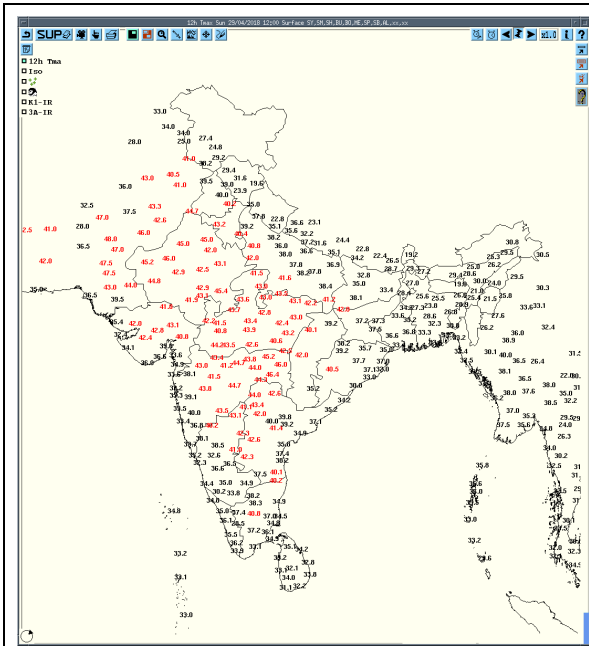
**IMR**



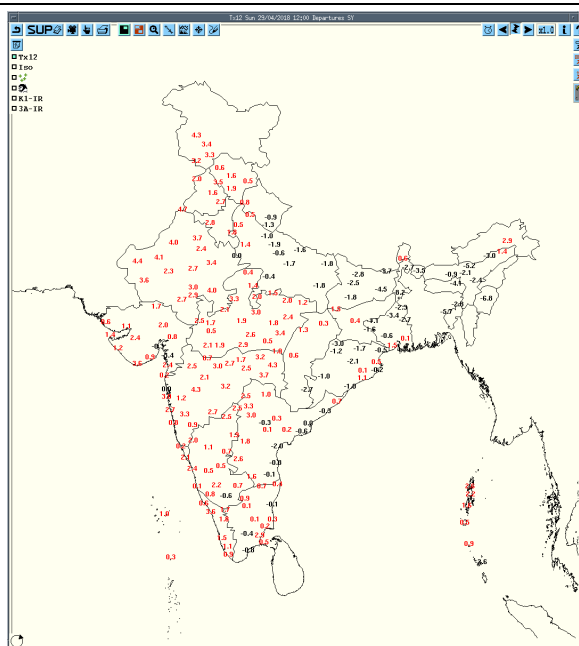
**HEM**



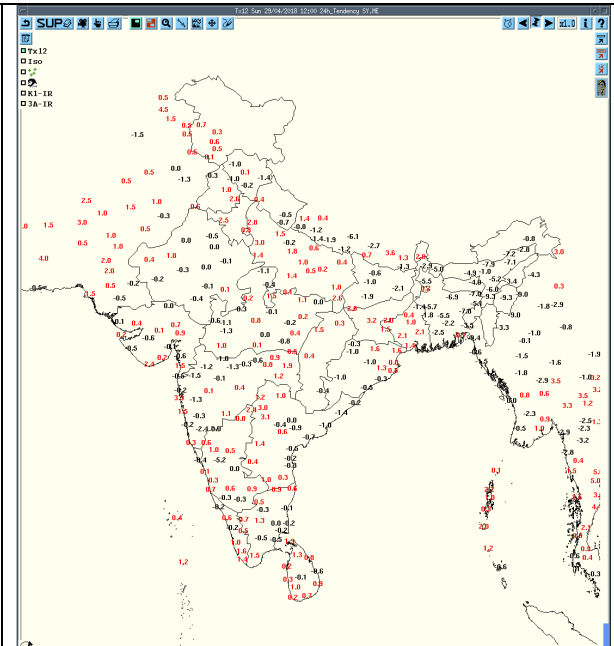
**3hourly Past weather at 06, 09, 12, 15, 18, 21 UTC of yesterday and 00 & 03 hrs UTC of today**



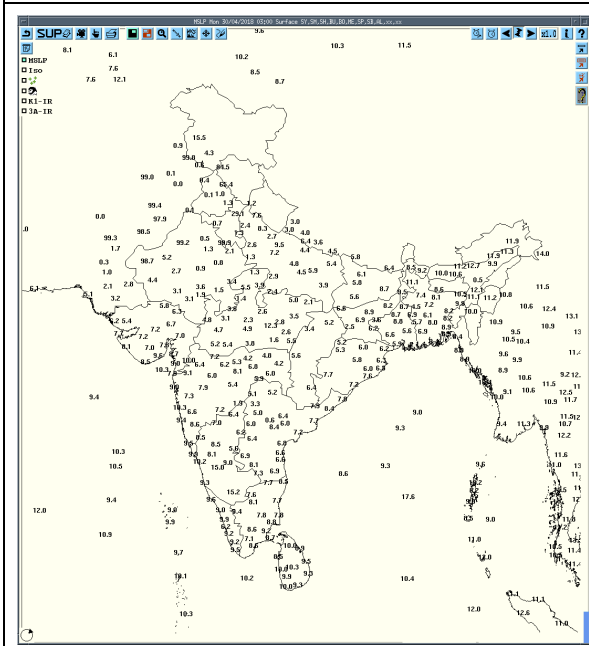
Tmax



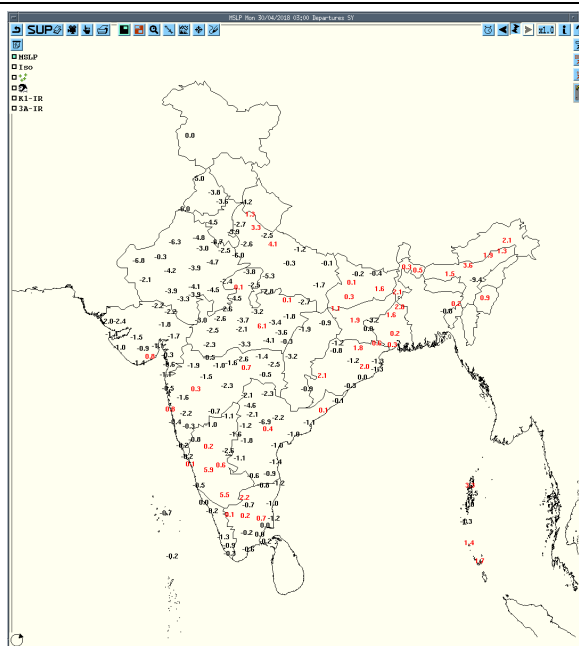
Departure Tmax



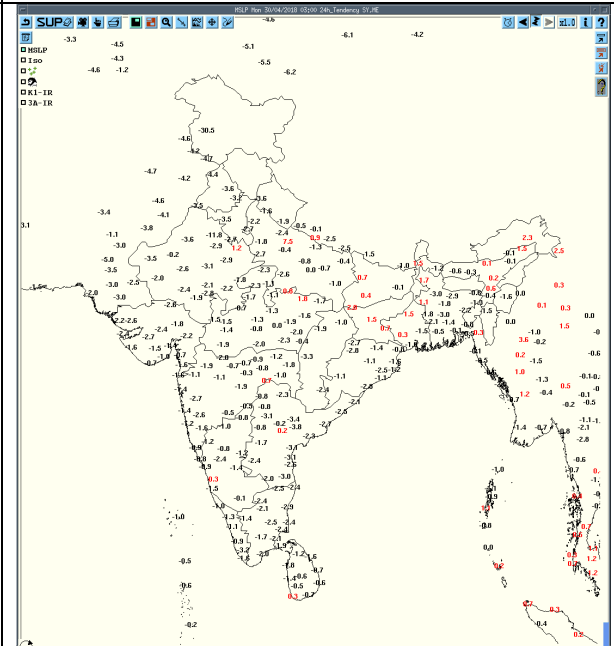
Tendency Tmax



MSLP



Departure MSLP



Tendency MSLP





## 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	30/04/18	290300 To 300300	MLTPL CELLS FORMATION @290335Z SUBSEQUENTLY FORMING SQUALL LINE,11KMS,47dbz	20 Km West;30 Kmph; E'ly	Cell Persisted Till 290712z	+TSRA	All Dists of TRP.
			LINE SQUALL FORMATION OVER ADJ B'DESH @290346Z,13kms,52dbz	200 Km NW,35 Kmph, E'ly	Cell Persisted Till 290712z	+TSRA	Not Known
			MLTPL Cells At 291152z,9kms,50dbz	50 Km;South;30 Kmph, NE'ly	Dissipated Over ADJ MZRM	+TSRA	Gomati & South Trp Dists
			Line Squall Formation Over ADJ B'DESH At 300300z,18 Kms,60dbz	220 Km WSW	Cell Approaching, Estimated Time:300800z	--	--
Visakhapatnam	30/04/18	290600	Isolated convective cells of maximum reflectivity of 42 dbz with height of 5 kms	NW (121) kms and moving NE ly	Isolated convective cell formed at 0341 UTC dissipated at 0411 UTC	NIL	NIL
		290900	Isolated convective cells of maximum reflectivity of 42 dbz with height of 7 kms	NE (194 kms) and moving SE ly	Dissipated	NIL	NIL
		291500	Conviction cell with reflectivity 38dbz and height 4kms	172kms(NE) 14:41UTC. Moving SE ly.	NIL	NIL	NIL
		291800	Convictive cell with reflectivity37dbz and height 4kms.	123kms(NE) formed at 16:01UTC. Moving Southerly.	-	-	-
		300300	Multiple cb cells formed with max reflectivity 50 dbz and height 10kms.	249kms(NNE) and moving SE ly.	Another Cb cell NE with reflectivity 46dbz	Downpour may take place .	Ganjam and Nayagarh(odi ssa)

adar 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	29-04-2018	0422-0531	Single cell with maximum reflectivity of 54.5 dBz at 0502 UTC and maximum height 10.66 km at 0502 UTC	N (150.7 km) Moving in ESE-wards direction	Cell formed at 0422 UTC in N at a distance of 150.7 km from Radar. Matured and moving completely into Bangladesh at 0531 UTC in NNE at 156.9 km from Radar	Thunderstorm/Rain	N/A
		0541-0902	NIL	NIL	NOSIG ECHO	NIL	NIL
		0911-1332	1. Multicelled system with maximum reflectivity of 63.0 dBz at 1121 UTC and maximum height 15.14 km at 1141 UTC  2. Multi celled system with maximum reflectivity of 66.0 dBz at 1141 UTC and maximum height more than 18 km at 1141 UTC	Coming from WNW and moving in SE-ward direction  Coming from WNW and moving in SE-ward direction	Cell coming from WNW at 0911 UTC. Matured and Dissipated in WSW at distance of 167.7 km from radar at 1332 UTC.  Cell coming from WNW at 1121 UTC. Matured and split into cell no. 3. And 4. At 1201 UTC	Thunderstorm/Rain	N/A
DWR KOLKATA	29-04-2018	0911-1332	3. Single cell with maximum reflectivity of 55.5 dBz at 1211 UTC and maximum height 11.11 km at 1211 UTC	WNW(215.3km) Moving ENE ward.	Cell formed from splitting of 2. at WNW 215.3 km from radar at 1201 UTC. Matured Dissipated in WNW at distance of 205.5 km from radar.	Thunderstorm/Rain	N/A
			4. Single cell with maximum reflectivity of 64.5 dBz at 1201 UTC and maximum height 12.99 km at 1201 UTC	WNW(215.3km) Moving ENE ward	Cell formed from splitting of 2. at WNW 215.3 km from radar at 1201 UTC. Matured Dissipated in W at distance of 166.6 km from radar at 1332 UTC	Thunderstorm/Rain	N/A
		1341-1611	5. Single cell with maximum reflectivity of 65 dBz at 1521 UTC and maximum height 15.40 km at 1541 UTC	W (241.5Km) Moving SE ward	Cell formed at 1341 UTC in W at a distance of 241.5 km from Radar. Matured Dissipated in WSW at a distance of 197.5 km from radar at 1611 UTC	Thunderstorm/Rain	N/A
		1612-2400	NIL	NIL	NOSIG ECHO	NIL	NIL
	30-04-2018	0001-0141	NIL	NIL	NOSIG ECHO	NIL	NIL
0151—cont...		Multi celled system with maximum reflectivity of 59.0 dBz at 0251 UTC and maximum height 13.79 km at 0241 UTC	WNW to NNW(191.6 to 227.6km) Moving E to SE ward	Cell formed at 0151 UTC in NW at a distance of 227.9 km from Radar. Matured ....cont.	Thunderstorm/Rain/Squall	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	30/04/18	290300-290430	<b>Single Cell</b> Lat-25.7122N Long-87.3087E Maximum Reflectivity: 44.5 dBZ Echo Top: 8.2 KM	Range: 223.1 KM from DWR Patna in East direction Movement: towards East	Warning issued	Thunderstorm	Supaul, Madhepura, Araria, Purnea, Katihar, Kishanganj
		290430-291032	NIL	N/A	N/A	N/A	N/A
		291032-291222	<b>Single Cell</b> Lat-27.2067N Long-84.0998E Maximum Reflectivity: 46 dBZ Echo Top: 10.3 KM	Range: 237.7 KM from DWR Patna in NW direction Movement: towards SE	Warning issued	Thunderstorm	West Champaran, East Champaran, Gopalganj
		291222-291802	NIL	N/A	N/A	N/A	N/A
		291802-300000	<b>Multiple Cells</b> Lat-25.4981N Long-87.4159E Maximum Reflectivity: 51.5 dBZ Echo Top: 9.9 KM	Range: 152.9 KM from DWR Patna in East direction Movement: towards East South east	Warning issued	Thunderstorm, Rain	SAHARSA, MADHEPURA, Khagaria, Purnea, Bhagalpur, Katihar
		291852-300300	<b>Multiple Cells</b> Lat-26.0174N Long-84.6484E Maximum Reflectivity: 54 dBZ Echo Top: 12.9 KM	Range: 202.4 KM from DWR Patna in NW direction Movement: towards SE			
292132-300300	<b>Multiple Cells</b> Lat-25.6869N Long-84.6431E Maximum Reflectivity: 50.5 dBZ Echo Top: 14.4 KM	Range: 110.8 KM from DWR Patna in ENE direction Movement: towards SE					
						Buxar, Bhojpur, Arwal, Jehanabad, Nalanda, Nawada, Gaya, Lakhisarai, Jamui, Sheikhpura, Munger, Bhagalpur, Banka	

## Realised past 24hrs TS/SQ/HS Data:

Realised TS/HS/SQ during past 24hours 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)
Bharatpur	Northwest India	East Rajasthan	Thunderstorm	29-04-18	1630	1700
Alwar	Northwest India	East Rajasthan	Thunderstorm	29-04-18	1730	1930
Pilani	Northwest India	East Rajasthan	Thunderstorm		1725	1800
Sundernagar	Northwest India	Himachal Pradesh	Thunderstorm	29-04-18	1549	1555
Dehradun	Northwest India	Uttarakhand	Thunderstorm	29-04-18	1508	1620
Mukteswar	Northwest India	Uttarakhand	Hailstorm	29-04-18	1310	1410
Safdarjung	Northwest India	Delhi	Thunderstorm	29-04-18	1520	1705
Hissar	Northwest India	Haryana	Thunderstorm	29-04-18	1510 1850	1525 2010
Passighat				29-04-18	29/1440	29/1510
Itanagar	Northeast India	Arunachal Pradesh	Thunderstorm	29-04-18	29/0830	29/0910
Silchar	Northeast India	Assam	Thunderstorm	30-04-18	30/0600	30/0830
Tezpur				29-04-18	29/0830	29/0900
Dhubri	Northeast India	Assam	Thunderstorm	30-04-18	30/0250	30/0330
Lengpui	Northeast India	Mizoram	Thunderstorm	29-04-18	29/1054	29/1430
Kailasahar	Northeast India	Tripura	Thunderstorm	29-04-18	29/0920	29/1300
Agartala	Northeast India	Tripura	Thunderstorm	29-04-18	29/0830 29/1225	29/1200 29/1350
Gwalior	Central India	Madhya Pradesh	Thunderstorm	30-04-18	0300	0405
Raipur	Central India	Chhattisgarh	Thunderstorm	29/30-04-18	1432 0700	1500 07:15
Pendra Road	Central India	Chhattisgarh	Thunderstorm	29-04-18	1500	1645

Realised TS/HS/SQ during past 24hours 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)
Jalpaiguri	East India	SHWB	Thunderstorm	30-04-18	0800	0830...
Malda	East India	SHWB	Thunderstorm	30-04-18	0005	0830...
<b>Malda</b>	<b>East India</b>	<b>SHWB</b>	<b>Hailstorm (Diameter-1.0cm)</b>	<b>30-04-18</b>	<b>0548</b>	<b>0549</b>

			(Diameter-1.5cm)		0602	0604
Asansol	East India	GWB	Thunderstorm	30-04-18	0740	0830...
Sriniketan	East India	GWB	Thunderstorm	30-04-18	0735	0830...
Patna	East India	Bihar	Thunderstorm	30-04-18	0358	0540
Gaya	East India	Bihar	Thunderstorm	30-04-18	0544	0810
Bhagalpur	East India	Bihar	Thunderstorm	30-04-18	0500	0740
Purnia	East India	Bihar	Thunderstorm	29-04-18	0830	0920
Purnia	East India	Bihar	Thunderstorm	30-04-18	0520 0800	0625 0820
Ranchi	East India	Jharkhand	Thunderstorm	29-04-18	1840	1900
<b>Ranchi</b>	<b>East India</b>	<b>Jharkhand</b>	<b>Hailstorm (Diameter-0.5cm)</b>	<b>29-04-18</b>	<b>1815</b>	<b>1817</b>
Ranchi	East India	Jharkhand	Thunderstorm	30-04-18	0520 0720	0550 0750
Jamshedpur	East India	Jharkhand	Thunderstorm	29-04-18	1640	2200
Jamshedpur	East India	Jharkhand	Thunderstorm	30-04-18	0550	0725
Bhubaneswar	East India	Odisha	Thunderstorm	30-04-18	0315	0420
Jharsuguda	East India	Odisha	Thunderstorm	29-04-18	1815	1855
Paradeep	East India	Odisha	Thunderstorm	30-04-18	0545	0615
Gopalpur	East India	Odisha	Thunderstorm	30-04-18	0515	0530
Keonjhar	East India	Odisha	Thunderstorm	29-04-18	1940	2150
Keonjhar	East India	Odisha	Thunderstorm	30-04-18	0045	0200
Kurnool	South India	Rayalaseema		29-04-18	1745	1815
Gadag	South India	NI Karnataka	Thunderstorm	29-04-18	1957	2040
Koppal	South India	NI Karnataka	Thunderstorm	29-04-18	1700	1730
Yelahanka IAF	South India	SI Karnataka	Thunderstorm	29-04-18	1700 2130	1800 2400

## 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](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/](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](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](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](http://satellite.imd.gov.in/img/3Ddaily_imr.jpg)

HEM: [http://satellite.imd.gov.in/img/3Ddaily\\_he.jpg](http://satellite.imd.gov.in/img/3Ddaily_he.jpg)

ForRadarimagesofthepast24hoursincludingmosaicofimages:

[http://ddgmui.imd.gov.in/dwr\\_img/](http://ddgmui.imd.gov.in/dwr_img/)

Satellite sounder based T- Phigram

[http://satellite.imd.gov.in/mAndhra\\_Pradesh\\_skm2.html](http://satellite.imd.gov.in/mAndhra_Pradesh_skm2.html)

## WEATHER SYMBOLS:



+ thunderstorm



+ heavy thunderstorm



sandstorm or dust storm



squall



hail shower



tropical storm



+ tornado



+ lightning



+ hurricane

∞	haze
☁	smoke
☁	dust or sand storm
☁	fog
☁	drizzle
•	rain
*	snow
▽	showers
△	hail
☁	thunderstorm
<b>Weather Symbols</b>	