

# India Meteorological Department

# FDP STORM Bulletin No. 108 (22-06-2018)

# **1. CURRENT SYNOPTIC SITUATION:**

#### NWFC Inference (0300UTC of the day):

• Conditions are becoming favourable for further advance of Southwest Monsoon over remaining parts of Assam, some more parts of Maharashtra, Chhattisgarh, Odisha, West Bengal and some parts of south Gujarat region, Jharkhand, Bihar and Madhya Pradesh during next 2-3 days.

◆ The Northern Limit of Monsoon continues to pass through Lat 19°N/ Long 60°E, Lat 19°N/ Long 70°E, Thane(including Mumbai), Ahmednagar, Buldhana, Amravati, Gondia, Titlagarh, Cuttack, Midnapore, Lat 24°N/ Long 89°E, Goalpara, Bagdogra and Lat 27°N/ Long 87°E.

• The Western Disturbance as a trough in mid & upper tropospheric levels with its axis at 5.8 km above mean sea level now runs roughly along Long 68°E to the north of lat 34°N.

• The cyclonic circulation over northwest Uttar Pradesh & adjoining Haryana now lies over southwest Uttar Pradesh & neighbourhood and extends upto 0.9 km above mean sea level.

• The East West trough from cyclonic circulation lies over southwest Uttar Pradesh to Sub Himalayan West Bengal extending upto 0.9 km above mean sea level.

• The cyclonic circulation over south Konkan & neighbourhood now lies between 3.6 and 5.8 above mean sea level.

• The off-shore trough at mean sea level from Maharashtra coast to Kerala coast persists.

• The cyclonic circulation over west central & adjoining northwest Bay of Bengal now lies over northwest Bay of Bengal & neighbourhood between 3.1 km and 5.8 km above mean sea level.

• The East West shear zone now runs roughly along latitude 19.0°N over India region between 3.1 and 7.6 km above mean sea level and tilts southwards with height.

♦ A trough runs from Bihar to northwest Bay of Bengal across Jharkhand at 1.5 km above mean sea level.

Satellite Observations during past 24 hrs and current observation:

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

#### Clouds descriptions within India:

**North:** Scattered low/medium clouds with embedded weak convection seen over Jammu & Kashmir, West Punjab, North Himachal Pradesh, Central & extreme Northeast Uttar Pradesh. Isolated low/medium clouds with embedded convection seen over rest Uttar Pradesh.

**East:** Broken low/medium clouds with embedded moderate to intense convection seen over East Sub Himalayan West Bengal adjoining extreme West Assam, Central Arunachal Pradesh adjoining Northeast Assam and West Meghalaya. Scattered low/medium clouds with embedded weak convection seen over Chhattisgarh, Odisha and North Bihar, rest Arunachal Pradesh, rest Assam, rest Meghalaya, Nagaland, Manipur and Mizoram. Scattered low/medium clouds over rest parts of the region except rest Bihar, West Jharkhand, Gangetic West Bengal and Tripura.

West: Scattered low/medium clouds with embedded moderate to intense convection seen over Southeast Gujarat. Scattered low/medium clouds with embedded isolated weak convection seen over Madhya Pradesh, East Gujarat, Maharashtra and Southeast Rajasthan.

**South:** Scattered low/medium clouds with embedded intense to very intense convection seen over Central Coastal Andhra Pradesh. Scattered low/medium clouds with embedded weak to moderate convection seen over rest parts of the region.

Arabian Sea: Broken low/medium clouds with embedded isolated moderate to intense convection seen over Arabian Sea off Maharashtra - Kerala – Karnataka Coast.

**Bay of Bengal & Andaman Sea:** Scattered low/medium clouds with embedded moderate to intense convection seen over Bay North of Lat 11.5N Andaman Sea, Arakan Coast & Gulf Of Martaban.

#### Past Observation:

Not received

#### DWR and RAPID Observations:

Light to Moderate multiple echoes observed on DWR Agartala, Bhopal, Hyderabad, Jaipur, Lucknow, Machilipatnam, Patiala and Thiruvananthapuram and light echoes observed on DWR Mohanbari, Mumbai, Paradeep and Patna at around 1630IST.

RAPID RGB Satellite imagery at 1500 IST indicates significant convection Uttarakhand, Central Uttar Pradesh, Southeast Bihar, Jharkhand, Central Assam, Nagaland, South Gangetic West Bengal, North coastal Odisha, North Chhattisgarh, West Madhya Pradesh, Maharashtra, Konkan adjoining Gujarat, Goa Telangana North Coastal Andhra Pradesh, Kerala and Lakshadweep 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 increase for next few days over IGP and north India.

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

Delhi – SAFAR analysis &	22.06.2018	23.06.2018
Forecast		
PM10 (micro-g/m <sup>3</sup> )	256	243
PM2.5 (micro-g/m <sup>3</sup> )	89	85

# 2. NWP MODEL GUIDANCE:

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

#### 1. Weather Systems:

Low level Cycirs, Troughs: 00UTC of Day 0-4: at 850 hPa, a trough as a weak CYCIR over UP and moving towards east.

00UTC Day0-5: At 850 hPa, extended trough from Bihar to Assam via WB and Bangladesh.

**00UTC Day0-3:** At 850 hPa, a trough over north Maharashtra, moving towards east and laying over Odisha on Day2-3.

# Confluence & wind Discontinuity regions: NIL

**Synoptic systems:** A fresh WD as trough over Pakistan and Punjab moving towards east and laying over Rajasthan and adjoining region on Day 3-4.

# 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^-5 /s

Day0: Assam Meghalaya, Day1: Uttarakhand, Day2: Assam Meghalaya, Uttarakhand, Day3: Tamilnadu Puducherry, Day4:

# 4. Low level Vorticity:-Positive Vorticity:

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

Day0: Arunachal Pradesh, Assam Meghalaya, Tamilnadu Puducherry,

Day1: Arunachal Pradesh, Assam Meghalaya, Uttarakhand, Himachal Pradesh, Tamilnadu Puducherry, Kerala, Day2: Assam Meghalaya, Bihar, Uttarakhand, Himachal Pradesh, Jammu Kashmir, Tamilnadu Puducherry, Kerala, Day3: Arunachal Pradesh, Assam Meghalaya, Bihar, East UP, Uttarakhand, Himachal Pradesh, Tamilnadu Puducherry, Kerala, Day4: Assam Meghalaya, Sub Himalayan WB, Bihar, Himachal Pradesh, Tamilnadu Puducherry, Kerala,

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

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

Day0: Arunachal Pradesh, Sub Himalayan WB, Jharkhand, Bihar, East UP, Uttarakhand, Himachal Pradesh, Jammu Kashmir, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Saurashtra Kutch, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana,

Day1: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, Uttarakhand, Punjab, Himachal Pradesh, Jammu Kashmir, East Rajasthan, Odisha, West MP, East MP, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Day2: Arunachal Pradesh, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Himachal Pradesh, Jammu Kashmir, East Rajasthan, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Kashmir, East Rajasthan, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Kashmir, East Rajasthan, 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, Punjab, Himachal Pradesh, Jammu Kashmir, West Rajasthan, Odisha, West MP, East MP, Vidarbha, Chhattisgarh,

Day4: Arunachal Pradesh, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West Rajasthan, Odisha, West MP, East MP, Vidarbha, Chhattisgarh, Coastal AP,

### 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, Uttarakhand, Himachal Pradesh, Jammu Kashmir, West Rajasthan,

Day1: Arunachal Pradesh, Sub Himalayan WB, Uttarakhand, Punjab, Himachal Pradesh, Jammu Kashmir,

Day2: Arunachal Pradesh, Sub Himalayan WB, Jharkhand, East UP, Uttarakhand, Punjab, Himachal Pradesh, Jammu Kashmir, East MP, Chhattisgarh,

Day3: Arunachal Pradesh, Sub Himalayan WB, Jharkhand, Bihar, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West Rajasthan, Chhattisgarh,

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

7. Spatial distribution of K Index :> 35[Very Unstable thunderstorm likely]:

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

Day0: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Himachal Pradesh, Jammu Kashmir, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Saurashtra Kutch, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Tamilnadu Puducherry, NI Karnataka, SI Karnataka,

Day1: Arunachal Pradesh, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Punjab, Himachal Pradesh, Jammu Kashmir, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Saurashtra Kutch, Marathwada, Vidarbha, Chhattisgarh, Telangana, Rayalaseema, Tamilnadu Puducherry, SI Karnataka, 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 Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Saurashtra Kutch, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, NI Karnataka, 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, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, NI Karnataka, 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, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Gujarat Region, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, NI Karnataka, 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, West Rajasthan, East Rajasthan, Odisha, West MP, East MP, Saurashtra Kutch, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, NI Karnataka, Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, West UP, Uttarakhand, Haryana, Chandigarh, Delhi, Pu

# 8. Rainfall and thunder storm activity:

# Day/Index: Subdivisions with Precipitation > 2 cm

Day1: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Bihar, Jammu Kashmir, Odisha, Konkan Goa, Madhya Maharashtra, Coastal AP, Telangana, Tamilnadu Puducherry, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day2: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Bihar, Odisha, Konkan Goa, Madhya Maharashtra, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Rayalaseema, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day3: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Bihar, Odisha, Konkan Goa, Madhya Maharashtra, Vidarbha, Chhattisgarh, Coastal AP, Telangana, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day4: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Jharkhand, Bihar, Odisha, Konkan Goa, Madhya Maharashtra, Chhattisgarh, Telangana, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

Day5: Arunachal Pradesh, Assam Meghalaya, NE NMMT, Sub Himalayan WB, Gangetic WB, Jharkhand, Bihar, East UP, Uttarakhand, Odisha, East MP, Konkan Goa, Madhya Maharashtra, Chhattisgarh, Coastal AP, Telangana, Coastal Karnataka, NI Karnataka, SI Karnataka, Kerala,

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

**1. Synoptic Systems:** The analysis based on 00 UTC shows a cyclonic circulation over Southwest Uttar Pradesh and adjoining areas in lower troposphere (925hPa). The forecast shows it will persist till day3. The analysis shows an East-West Trough extends from this cyclonic circulation to SHWB at (925hPa). The forecast shows it will persist till day3. The analysis shows an off-shore Trough at mean sea level extends from Maharashtra coast to Kerala coast and forecast shows it will persist till day3. The analysis shows a trough extends from Bihar to Northwest Bay of Bengal across Jharkhand at (850hPa). The forecast shows it will persist till day2 with slight Eastward shift.

2. Location of Jet and Jet Core (>60kt) at 500hPa: There is no jet core over the Indian region for the next 3 days.

**3. Low Level Vorticity {850hPa Positive Vorticity (>12 x 10<sup>-1</sup>/s)}:** Low level Positive Vorticity is seen mostly around the cyclonic circulation, from Foothills of Himalaya, Sikkim to NE states, GWB, SHWB, and over Tamil Nadu, Kerala and NE states during next 3 days; over parts of East and West Uttar Pradesh from day 1.

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

**T-Storm Initiation Index (> 3):** Over parts of Gujarat, Rajasthan, Bihar, Jharkhand, East and adjoining West Uttar Pradesh, Gangetic West Bengal, SHWB, Orissa, Madhya Pradesh, Vidarbha, northern parts of Madhya Maharashtra, Marathwada, north coastal Maharashtra, Telangana, along east coast of India, coastal Andhra Pradesh, coastal Tamil Nadu, Sikkim and adjoining areas on all 3 days.

Lifted Index (< -2): over parts of J&K, Himachal Pradesh, Punjab, Haryana, Gujarat, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Gangetic West Bengal, SHWB, Orissa, North coastal Maharashtra, Madhya Maharashtra, Marathwada, Vidarbha, coastal Tamil Nadu, Telangana, Chhattisgarh, East and west Madhya Pradesh, coastal Andhra Pradesh, along east coast of India, Sikkim, NE states during next 3 days.

**Total Total Index (> 50):** Higher than Threshold value of the Index is seen over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Vidarbha, Chhattisgarh, foothills of Himalaya, Sikkim and Arunachal Pradesh during next 3 days; over parts of Bihar and Jharkhand on day 3.

Sweat Index (> 300): Is seen over the sub-divisions along east and west coast, areas along foothills of Himalayas, Central India, South Peninsular India, NE states and most parts of the country during next 3 days; significant zone lies over parts of Gujarat, J&K, Uttarakhand, Himachal Pradesh, Foothills of Himalaya, Sikkim and Arunachal Pradesh.

CAPE (> 1000): Mostly seen over parts of Gujarat, Rajasthan, East Uttar Pradesh, coastal areas along east coast, GWB, SHWB, Bihar, Jharkhand, coastal Andhra Pradesh, coastal Tamil Nadu, Madhya Pradesh, Vidarbha, North coastal Maharashtra including Mumbai, Northern

parts of Madhya Maharashtra, Marathwada, Telangana, Chhattisgarh, some parts of Rayalaseema, Sikkim and NE states during next 3 days.; over parts of West Uttar Pradesh from day 2 onwards.

**CIN (50-150):** Mostly seen over Central India, GWB, SHWB, Bihar, Jharkhand, Uttar Pradesh, east coast of India and parts of Gujarat, Eastern parts of India and NE states and over most of the parts of the country except J&K, Himachal Pradesh, Uttarakhand and coastal areas along the southern parts of West coast including Karnataka and its coastal areas, Kerala, South Madhya Maharashtra, Konkan and Goa during next 3 days.

#### 5. Rainfall Activity:

Above 130 mm Rainfall: over parts of Sikkim and adjoining area on day 2.

70-130 mm Rainfall: over parts of Arunachal Pradesh, Sikkim and Assam on day 2; over some parts of GWB and Nagaland on day 3.

40-70 mm Rainfall: over parts of Sikkim, NE states, coastal Maharashtra including Mumbai and coastal Gujarat during next 3 days; over parts of Chhattisgarh, North Interior Karnataka and Telangana on day 1; over parts of East Madhya Pradesh, East Rajasthan, SHWB, GWB, and Chhattisgarh on day 2; over parts of East Rajasthan, Chhattisgarh and GWB on day 3.

10-40 mm Rainfall: over parts of J&K, coastal and Interior Karnataka, Kerala, coastal Maharashtra including Mumbai, coastal Tamil Nadu, Konkan and Goa, Madhya Maharashtra, Marathwada, Vidarbha, Chhattisgarh, Jharkhand, East Bihar, Orissa, Telangana, Andhra Pradesh, Rayalaseema, Madhya Pradesh, Gujarat, East Rajasthan, Sikkim and NE states during next 3 days.

Up to 10 mm rainfall: Over parts of J&K, Himachal Pradesh, Uttarakhand, Rajasthan, Uttar Pradesh, Foothills of Himalaya, GWB, SHWB, Sikkim, NE states, Bihar, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Vidarbha, Kerala, Interior Karnataka, Konkan & Goa, coastal Maharashtra including Mumbai, Gujarat, Madhya Maharashtra, Marathwada, Tamil Nadu, Telangana and Andhra Pradesh during next 3 days; over parts of Punjab and Haryana on day 2.

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

1. Model Reflectivity (Max. dBz):>25 dBZ Model Reflectivity: On Day 1 and 2 over parts of J&K, coastal areas along the west coast, Telangana, Konkan and Goa, Vidarbha, Madhya Maharashtra, Gujarat, East Rajasthan, Chhattisgarh, Orissa, Bihar, Andhra Pradesh, Kerala, Coastal Maharashtra, Madhya Pradesh, Marathwada, Sikkim and NE states; On day 3 over parts of North west Madhya Pradesh adjoining East Rajasthan and South Haryana, coastal areas along the west coast, Bihar, Jharkhand, East Uttar Pradesh, Orissa GWB, SHWB, Sikkim, NE states, Madhya Pradesh, Chhattisgarh, Vidarbha and adjoining areas.

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

**Total Index (> 50):** The value of the index greater than the threshold value is seen over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh, and Rajasthan, Northern parts of Madhya Pradesh, Bihar, Jharkhand, North Chhattisgarh, East Vidarbha and North Gujarat with prominent values are found over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh adjoining Northwest Madhya Pradesh, parts of East Uttar Pradesh and Rajasthan.

**K-Index (> 35):** Less than threshold value is observed over most of the part of the country during the next 3 days. Prominent values are found over parts of J&K, Himachal Pradesh, Uttarakhand, Rajasthan, Madhya Pradesh, Vidarbha, coastal Maharashtra including Mumbai, Madhya Maharashtra, Marathwada, Karnataka, Telangana, Chhattisgarh, Andhra Pradesh, Kerala, Tamil Nadu, Gujarat, Orissa, Bihar, Jharkhand, Uttar Pradesh, GWB, SHWB, Foothills of Himalaya, Sikkim and NE states.

**CAPE (> 1500):** Greater than threshold value over Gangetic plains, Gujarat, Rajasthan, coastal areas of west coast, coastal Maharashtra including Mumbai, Konkan & Goa, coastal Karnataka, coastal Kerala, coastal areas along the east coast, SHWB, GWB, Orissa, East Uttar Pradesh, coastal Andhra Pradesh, coastal Tamil Nadu, Bihar, Jharkhand Orissa, Madhya Pradesh, Chhattisgarh, Vidarbha, Madhya Maharashtra, Marathwada, Telangana, GWB, SHWB, Sikkim and NE states during next 3 days; over parts Punjab and Haryana on day 1; over

parts of West Uttar Pradesh and Uttarakhand on day 2 and 3; Prominent value of the index is seen over parts of GWB, Bihar, SHWB, Jharkhand, Orissa, Vidarbha, East Uttar Pradesh, East Madhya Pradesh, Chhattisgarh and coastal Andhra Pradesh.

**CIN (50-150):** The value of the index lies in the 50-150 range over parts of North India, Northwest India, central India, Bihar Jharkhand, GWB and SHWB, NE states except J&K and coastal areas along the southern parts of west coast on day 1; and over most of the parts of the country except J&K, Himachal Pradesh, Uttarakhand, South Peninsular India and NE states on day 2 and 3; significant zone with maximum value of index lies over parts of Rajasthan, Punjab, Haryana, Delhi, Madhya Pradesh and Uttar Pradesh.

#### 3. Rainfall and thunderstorm activity:

**Total Index (> 50):** The value of the index greater than the threshold value is seen over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh, and Rajasthan, Northern parts of Madhya Pradesh, Bihar, Jharkhand, North Chhattisgarh, East Vidarbha and North Gujarat with prominent values are found over parts of J&K, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh adjoining Northwest Madhya Pradesh, parts of East Uttar Pradesh and Rajasthan.

**K-Index (> 35):** Less than threshold value is observed over most of the part of the country during the next 3 days. Prominent values are found over parts of J&K, Himachal Pradesh, Uttarakhand, Rajasthan, Madhya Pradesh, Vidarbha, coastal Maharashtra including Mumbai, Madhya Maharashtra, Marathwada, Karnataka, Telangana, Chhattisgarh, Andhra Pradesh, Kerala, Tamil Nadu, Gujarat, Orissa, Bihar, Jharkhand, Uttar Pradesh, GWB, SHWB, Foothills of Himalaya, Sikkim and NE states.

**CAPE (> 1500):** Greater than threshold value over Gangetic plains, Gujarat, Rajasthan, coastal areas of west coast, coastal Maharashtra including Mumbai, Konkan & Goa, coastal Karnataka, coastal Kerala, coastal areas along the east coast, SHWB, GWB, Orissa, East Uttar Pradesh, coastal Andhra Pradesh, coastal Tamil Nadu, Bihar, Jharkhand Orissa, Madhya Pradesh, Chhattisgarh, Vidarbha, Madhya Maharashtra, Marathwada, Telangana, GWB, SHWB, Sikkim and NE states during next 3 days; over parts Punjab and Haryana on day 1; over parts of West Uttar Pradesh and Uttarakhand on day 2 and 3; Prominent value of the index is seen over parts of GWB, Bihar, SHWB, Jharkhand, Orissa, Vidarbha, East Uttar Pradesh, East Madhya Pradesh, Chhattisgarh and coastal Andhra Pradesh.

**CIN (50-150):** The value of the index lies in the 50-150 range over parts of North India, Northwest India, central India, Bihar Jharkhand, GWB and SHWB, NE states except J&K and coastal areas along the southern parts of west coast on day 1; and over most of the parts of the country except J&K, Himachal Pradesh, Uttarakhand, South Peninsular India and NE states on day 2 and 3; significant zone with maximum value of index lies over parts of Rajasthan, Punjab, Haryana, Delhi, Madhya Pradesh and Uttar Pradesh. Above 200 mm Rainfall: over parts of Sikkim and adjoining areas on all 3 days.

Above 200 mm Rainfall: over parts of Sikkim and adjoining areas on all 3 days.

#### 3. Rainfall and thunderstorm activity:

130-200 mm Rainfall: over parts of Sikkim during all 3 days; over parts of Assam and Arunachal Pradesh, on day 2 and 3; over parts of Meghalaya on day 3.

70-130 mm Rainfall: over parts of Sikkim, Assam, Arunachal Pradesh and coastal Maharashtra on all 3 days; over parts of coastal Karnataka adjoining North Kerala, Konkan and Goa, East Bihar and SHWB on day 2; on all three days; over parts of North Interior Karnataka on day 1; over parts of SHWB on day 2 and 3; over parts of GWB and Foothills of Himalaya on day 3.

40-70 mm Rainfall: over west coast from coastal Maharashtra, Konkan and Goa, coastal Karnataka to Kerala and adjoining South Tamil Nadu, Sikkim, SHWB, NE states, some parts of Orissa and Chhattisgarh on all 3 days; over parts of Marathwada and Telangana on day 2; over parts of Jharkhand and GWB on day 3.

10-40 mm Rainfall: over parts of J&K, Foothills of Himalaya, Madhya Pradesh, Vidarbha, Gujarat, Kerala, Tamil Nadu, coastal and Interior Karnataka, Konkan and Goa, coastal Maharashtra including Mumbai, Sikkim, Orissa, Telangana, Madhya Maharashtra, Marathwada, Chhattisgarh, Bihar, Jharkhand, Andhra Pradesh, Sikkim, GWB, SHWB and NE states during next 3 days; over parts of East Rajasthan on day 3. Up to 10 mm Rainfall: Over parts of J&K, Himachal Pradesh, Uttarakhand, Foothills of Himalaya, Rajasthan, Kerala, Tamil Nadu, coastal and Interior Karnataka, Konkan and Goa, Sikkim, GWB, SHWB, Uttar Pradesh, Bihar, Jharkhand, Orissa, Telangana, Madhya Maharashtra, Marathwada, Vidarbha, coastal Maharashtra including Mumbai, Madhya Pradesh, Bihar, Jharkhand, Orissa, Telangana, Madhya Maharashtra, Marathwada, Vidarbha, coastal Maharashtra including Mumbai, Madhya Pradesh, Andhra Pradesh, Gujarat and NE states during next 3 days, over some parts of Punjab, Haryana and adjoining areas on day 1.

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

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

- Synoptic analysis indicates that the off shore trough at mean sea level runs from Maharashtra coast to Kerala coast. Also, a cyclonic circulation lies over south Konkan & neighbourhood between 3.6 and 5.8 above mean sea level and an East-west shear zone runs roughly along latitude 19.0°N over India region between 3.1 and 7.6 km above mean sea level tilting southwards with height. Under the influence of the above meteorological conditions, heavy to very heavy rain at isolated places over Vidarbha, Konkan & Goa and isolated heavy rainfall over Odisha, Madhya Maharashtra, Marathwada, Telangana, Coastal Karnataka & Kerala is very likely on Day 1 and Day 2. On day 2, there may also be isolated heavy rainfall over South Interior Karnataka. Further, the above conditions may result in isolated thunderstorm activity accompanied with gusty winds over Tamilnadu, Rayalaseema, Coastal Andhra Pradesh and Telangana on Day 1 & Day 2.
- Synoptic analysis also indicates the presence of a Western Disturbance as a trough in mid & upper tropospheric levels with its axis at 5.8 km above mean sea level running roughly along Long 68°E to the north of lat 34°N. Also, a cyclonic circulation lies over southwest Uttar Pradesh & neighbourhood and extends upto 0.9 km above mean sea level. As a result, isolated thunderstorm activity accompanied with gusty winds is likely over Uttarakhand, Haryana, Chandigarh & Delhi and West Uttar Pradesh on Day 1. This activity is likely to cease from the area on Day 2.
- In addition, an East-West trough runs from the cyclonic circulation over southwest Uttar Pradesh to Sub Himalayan West Bengal extending upto 0.9 km above mean sea level. Another trough runs from Bihar to northwest Bay of Bengal across Jharkhand at 1.5 km above mean sea level. Under the influence of these conditions, isolated thunderstorms accompanied with gusty winds are expected over Jharkhand, Bihar, Gangetic West Bengal and Odisha on Day 1.
- The prevailing synoptic conditions together with NWP model analysis also indicates possibility of isolated heavy rainfall over Sub Himalayan West Bengal & Sikkim, Assam & Meghalaya on Day 1 which is likely to increase in intensity on Day 2. Arunachal Pradesh and Nagaland, Manipur, Mizoram & Tripura are also very likely to experience isolated heavy rainfall on Day 2.

### IOP Area for Day-1 & Day-2:

24 hour Advisory for IOP:	48 hour Advisory for IOP:
Significant Rainfall:	Significant Rainfall:
Kerala, Coastal Karnataka,	Kerala, Coastal Karnataka, North interior Karnataka,
Telangana, North Coastal Andhra Pradesh	Telangana, North Coastal Andhra Pradesh
Saurashtra, Konkan & Goa, Maharashtra, Vidarbha	Saurashtra, Konkan & Goa, Maharashtra, Vidarbha
Sub Himalayan West Bengal & Sikkim, Odisha	Sub Himalayan West Bengal & Sikkim, Odisha
Assam & Meghalaya	Arunachal Pradesh, Assam & Meghalaya
Thunderstorm with squall or gusty winds: Tamilnadu, Rayalaseema, Telangana, Coastal Andhra Pradesh Haryana, Chandigarh, Delhi, Uttrakhand, West Uttar Pradesh Gangetic West Bengal, Bihar, Jharkhand, Odisha	Thunderstorm with squall or gusty winds: Tamilnadu, Rayalaseema, Telangana, Coastal Andhra Pradesh
Thunderstorm with squall and hail	Thunderstorm with squall and hail
Nil	Nil
Thunderstorm/Duststorm:	Thunderstorm/Duststorm:
Nil	Nil

# **Graphical Presentation of Potential Areas for Severe Weather:**















# 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
Patiala	22-06-18	21/06/2018 0300 - 0600	No Significant Echo				
		21/06/2018 0600 -0900	No Significant Echo				
		21/06/2018 0900- 1200	MULTIPLE CELLS DBZ 40.0 HT. 06-08 KM	NE SECTOR MOVEMENT SE - WARDS		RA/DZ	DHARAMSHALA, PALAMPUR, KULLU and their adjoining areas.
		21/06/2018 1200 - 1500	MULTIPLE CELLS DBZ 39.0 HT. 06-08 KM	N, NE SECTOR MOVEMENT SE - WARDS		RA/DZ	CHAMBA, KEYLONG, KALPA and their adjoining areas.
		21/06/2018 22/06/2018 0000-0252	NO SIG. ECHO				
Agartala	22/06/18	210300 to 220300	NO SIGNIFICANT ECHO				
Jaipur	22/06/18	07:02 UTC of 21/06/18 to 02:12 UTC of 22/06/18	Multiple cell with average height of 6.0 km & maximum reflectivity 54.0 dBZ	Multiple cell develop from 07:02 UTC of 21/06/18 towards W,SW,NE,NW,E, S,N,SE of Jaipur and moved to E, SE,NE Wards at speed 10-15 km/hr	Multiple cell develop from 07:02 UTC of 21/06/18 towards W,SW,NE,NW,E,S,N,SE of Jaipur and reaches maximum reflectivity at 08:42 UTC of 21/06/2018 and Died at 02:12 UTC of 22.06.2018.	Duststorm/Thun derstorm/ Light rain at Isolated places	Nagaur, Sawai Madhopur, karauli, Ajmer, , Sikar, Jaipur, Dausa, Alwar Jhunjhunu, Chittorgarh, Bharatpur, Bhilwara, Kota, Bundi, Baran Districts.

Radar Station name	Date	Time interval of observati on (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
Visakhapatnam	21/06/18	0600UTC	Convective region over the sea towards East with max reflectivity 41dbz and height 8kms.	125kms(E) and moving NWly	-	-	Over the sea
Visakhapatnam	21/06/18	0900UTC	Convective region over the sea towards East to NE and a small cb cell with max reflectivity 57dbz and height 10kms.	95kms(W) and moving SEly	-	Lightning	Visakhapatnam, East Godavari(AP) and over the sea
Visakhapatnam	21/06/18	1200UTC	Convective region over the sea and towards West to NE with max reflectivity 58dbz and height 10kms.	51kms(W), 104km(SW) and moving SEly	Cb cells are developing	Lightning and TS	Visakhapatnam, East Godavari, west West Godavari(AP) and over the sea
Visakhapatnam	21/06/18	1500UTC	Multiple cb cells towards West to North with max reflectivity 58dbz and height 10kms.	69kms(N), 89km(SW) and moving Ely	Cb cells are developing	Lightning and TS	Visakhapatnam, East Godavari(AP) and over the sea
Visakhapatnam	21/06/18	1800UTC	Multiple cb cells towards NE and over the sea with max reflectivity 58dbz and height 10kms.	36kms(N), 150km(E) and moving SEly	Cb cells are developing	Lightning and TS	Srikakulam,Visakhap atnam, (AP), Rayagada(Odisha) and over the sea
Visakhapatnam	22/06/18	0000UTC	Multiple cb region over the sea with max reflectivity 55dbz and height 10kms.	13kms to 114km and moving SEly	Cb cells are developing	Lightning and TS	Srikakulam,Visakhap atnam, (AP) and over the sea
Visakhapatnam	22/06/18	0300UTC	Merged cb cells in the region over the sea with max reflectivity 55dbz and height 8kms.	157kms(SE) 02:01UTC. And moving NEly over the sea.	Maximum cb cells of lower reflectivity are at conciction with the reported region .	Slight right over the station of DWRVSK/	Visakhapatnam, vizianagaram, (AP).

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

Realised TS/HS/SQ during past 24hours ending at 0300UTC of today (received from RMCs/MCs)						
Station	Region	State/Sub Division	Weather Event (TS/Hail/Squall)	Date	Time of	Time of end
					Commencement (IST)	(151)
Pahalgam	Northwest India	Jammu & Kashmir	Thunderstorm	21-06-18	1655	1740
					1850	1940
Banihal	Northwest India	Jammu & Kashmir	Thunderstorm	21-06-18	1350	1400
Batote	Northwest India	Jammu & Kashmir	Thunderstorm	21-06-18	1510	1535
Bhaderwah	Northwest India	Jammu & Kashmir	Thunderstorm	21-06-18	1500	1700

Alwar	Northwest India	East Rajasthan	Thunderstorm	21-06-18	1610	1645
Pilani	Northwest India	East Rajasthan	Thunderstorm	21-06-18	1730	1735
Dabok (Udaipur)	Northwest India	East Rajasthan	Thunderstorm	21-06-18	1520	1610
Sawaimadhopur	Northwest India	East Rajasthan	Thunderstorm	21-06-18	1300	1330
Passighat	Northeast India	Arunachal Pradesh	Thunderstorm	22-06-18	22/0730	22/0800
Itanagar	Northeast India	Arunachal Pradesh	Thunderstorm	22-06-18	22/0010	22/0100
					22/0730	22/0800
Jorhat	Northeast India	Assam	Thunderstorm	21-06-18	21/1245	21/1440
Silchar	Northeast India	Assam	Thunderstorm	21-06-18	21/1930	22/0200
N/Lakhimpur	Northeast India	Assam	Thunderstorm	22-06-18	22/0315	22/0420
-				04.00.40	22/0810	22/0830
Tezpur	Northeast India	Assam		21-06-18	21/1045	21/1115
Dhubri	Northeast India	Assam	Inunderstorm	22-06-18	22/0115	22/0405
Daranani	Northeast India	Maghalaya	Thundaratarm	21.06.19	22/0820	22/0830
Charropupiag	Northeast India	Maghalaya	Thunderstorm	21-06-18	21/1100	21/1230
Shillong	Northeast India	Meghalaya	Thunderstorm	21-00-10	21/2000	22/0630
Shillong			Thundorstorm	21.06.19	21/1000	21/1400
Alipore	East mula	GWB	Inunderstorm	21-00-10	1400	1440
DumDum	East India	GWB	Thunderstorm	21-06-18	1120	1435
Diamond Harbour	East India	GWB	Thunderstorm	21-06-18	1255	1440
	E a a tel a di a	014/5		04.00.40	1500	1545
Haldia	East India	GWB	Inunderstorm	21-06-18	1232	1450
Digha	East India	GWB	Thunderstorm	21-06-18	1330	1650
Ranchi	East India	Jharkhand	Thunderstorm	21-06-18	1315	1730
Daltonganj	East India	Jharkhand	Thunderstorm	21-06-18	1455	1530
Bhubaneswar	East India	Odisha	Thunderstorm	21-06-18	1140	1450
				04.00.40	1725	2200
Balasore	East India	Odisha	Thunderstorm	21-06-18	1215	1700
Jharsuguda	East India	Odisha	Thunderstorm	21-06-18	1645	1900
Chandbali	East India	Odisha	Thunderstorm	21-06-18	1320	1340
	Feet India	Odiaha	Thursdayetaye	24.00.40	1515	1745
Paradeep	East India	Odisha	Inunderstorm	21-06-18	1720	1840
Puri	East India	Odisha	Thunderstorm	21-06-18	1830	2100
Gopalpur	East India	Odisha	Thunderstorm	21-06-18	1140-1310	1310
				04.00.40	2100-2400	2400
Keonjhargarh	East India	Udisha	Inunderstorm	21-06-18	1225	1800
Kalaburgi	South India	North Interior Karnataka	Thunderstorm	21-06-18	1630-1850 1910-2100	1630-1850 1910-2100

# **IMPORTANT LINKS:**

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



