

**Ministry of Earth Sciences
India Meteorological Department**



Urban Meteorological Services for Bhopal

In pursuit of providing integrated Early Warning System, India Meteorological Department (IMD) has developed Urban Meteorological Services for Bhopal.

The Urban Meteorological Services webpage provides:

- 1) Current Weather Observations
- 2) Current Air quality Observations
- 3) Radar, Lightning and Satellite products
- 4) District-wise/City weather warnings
- 5) Nowcasting (District-wise/Station wise)

1) Weather Observations

The Ambient Air Temperature, Relative Humidity, Precipitation, Wind Speed and Wind Direction are basic weather observations. Hourly weather parameters observed using Automatic Weather Stations (AWS) from different locations are presented and also displayed in graphical form. An AWS is a meteorological station at which observations are made and transmitted automatically. All the observations are reported in Indian Standard Time (IST) on 24 hour clock time.

- (i) **Ambient Air Temperature:** The unit of measurement is Degree Celsius ($^{\circ}\text{C}$). In AWS, the air temperature is measured using electrical resistance thermometer.
- (ii) **Relative Humidity (RH):** It refers to the moisture content (i.e., water vapor) of the atmosphere, expressed as a percentage. RH is measured with sensor called hygrometer.
- (iii) **Rainfall:** Rainfall is expressed as the depth to which it would cover a horizontal projection of the Earth's surface, if there is no loss by evaporation, run-off or infiltration. It is expressed in terms of millimeter (mm). Rainfall is measured using automatic rain gauge.
- (iv) **Wind Speed:** The unit of measurement is kilometre per hour (km/h). The anemometer is the instrument used to measure wind speed.
- (v) **Wind Direction:** Meteorological wind direction is defined as the direction from which it originates. For example, a northerly wind (coming from North direction) blows from the north to the south. Wind direction is measured in degrees clockwise from due north. The wind direction is measured using windvane.
- (vi) **Districtwise rainfall monitoring scheme:** Cumulative rainfall observed using Districtwise rainfall monitoring scheme are presented for past seven days.

2) Air Quality Observations

- (i) **PM10:** particles with diameters that are 10 micrometers and smaller. The concentration of PM10 is measured in micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$).
- (ii) **PM2.5:** fine inhalable particles, with diameters that are 2.5 micrometers and smaller. The concentration of PM2.5 is measured in micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$).

(iii) **Ground level Ozone:** It is a colorless and highly irritating pollutant gas. Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. The concentration of surface ozone is measured in micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$).

3. Radar, Lightning and Satellite products

Currently, radar reflectivity, lightning and satellite derived clouds products are presented here.

4. Forecast Products

(i) **Weather Forecast Bulletin:** District-wise/city-wise weather forecast for Bhopal for next five days.

(ii) **Warnings:** District-wise/City warnings for severe weather such as Thunderstorm, Heavy Rainfall etc for next 5-days is provided by IMD in colour coded form so that general public can easily understand.

Green – No Warning; Yellow – Watch; Orange – Alert; Red – Warning.

(iii) **Nowcast:** District wise/station-wise Nowcast warnings are provided graphically on map with different colours. A weather forecast in which the details about the current weather and forecasts up to a few hours ahead (but less than 24 hours) are given is called Nowcast.

Green – No Warning; Yellow – Watch; Orange – Alert; Red – Warning.

Time (UTC and IST): The UTC stands for Universal Time Coordinate, previously known as Greenwich Mean Time (GMT). Indian Standard Time (IST) is UTC (GMT) plus 05 hours 30 minutes.

Data Contribution acknowledged to:

Central Pollution Control Board (CPCB), M.P Pollution Control Board, Indian Institute of Tropical Meteorology (IITM), India Meteorological Department (IMD)

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