

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 530
ANSWERED ON 23/07/2026

WEATHER FORECASTING AND EARLY WARNINGS

530. SHRI UJJWAL DEORAO NIKAM:

Will the Minister of **EARTH SCIENCES** be pleased to state:

- (a) the details and objectives of "Mission Mausam", and the current stage of its implementation, State-wise and district-wise especially in Maharashtra;
- (b) the number of Doppler Weather Radars installed or proposed to be installed under the Mission, and the districts/regions presently covered;
- (c) the steps taken to strengthen Panchayat-level and hyper-local weather forecasting and early-warning dissemination, in view of the ongoing monsoon season especially in Maharashtra; and
- (d) the disaster-preparedness measures undertaken place in coordination with State Governments to mitigate the flood and extreme-weather events during the current monsoon?

ANSWER

THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a)-(b) The Mission Mausam was launched by the Honorable Prime Minister on 14 January 2025 with the goal of making the country, including Maharashtra, a 'Weather-ready and Climate-smart' nation. The objective of Mission Mausam is to strengthen various components of the Earth System observations, to realize Earth System approach to provide an early warning system, for seamless weather and climate services to all. The scheme seeks to exponentially enhance the country's weather and climate observations, understanding, modelling and forecasting, leading to better, more useful, accurate, and timely services. The key objectives of this Mission include:

- Developing cutting-edge weather surveillance technologies and systems.
- Implementing higher-resolution atmospheric observations with improved temporal and spatial sampling and coverage.
- Deploying next-generation radars, wind profilers, and satellites equipped with advanced instrument payloads.
- Implementing advanced high-performance computing (HPC) systems.
- Enhancing our understanding of weather and climate processes and improving prediction capabilities.

- Developing advanced Earth system models and data-driven methods, including the use of AI/ML
- Creating technologies and protocols for effective weather management
- Establishing a state-of-the-art Decision Support System (DSS) and dissemination system for last-mile connectivity
- Strengthening capacity building and research collaborations

The current status of the observational network and modeling capability are as follows:

- India Meteorological Department (IMD) presently receives data from a network of 50 Doppler Weather Radars (DWRs) operated by IMD and other MoES institutions and ISRO across the country. The observational network is being progressively strengthened through the deployment of 29 C-Band DWRs, 45 X-Band DWRs, and 12 S-Band DWRs across the country to enhance weather monitoring observations, numerical weather prediction, and the study of atmospheric dynamics. These initiatives are expected to significantly improve the country's observational capabilities, including those in Maharashtra. The current DWR network in Maharashtra is given in Annexure-I.
- Under the Mission Mausam initiative, various global and regional Numerical Weather Prediction (NWP) modeling systems have been implemented and operationalized to provide seamless short-range, medium-range, and extended-range weather forecasts, thereby further enhancing the accuracy and reliability of weather forecasting services. There are two different frameworks of global modeling systems based on global forecast systems (GFS) of IMD and Mithuna modeling systems of NCMRWF, Noida. Both models run in real-time with a horizontal resolution of 12 km. The New Bharat Forecasting System (BharatFS) is operational at a very high resolution of 6 km to cater to block levels and further to panchayat levels. In order to provide computational support for such high-resolution models and to make it regularly run in real time, the computing facilities have also been substantially increased with computational power to integrate voluminous data and to run mesoscale, regional, and global models at higher resolution. The "Arunika" supercomputing system at the National Centre for Medium Range Weather Forecasting (NCMRWF), Noida, and the "Arka" system at the Indian Institute of Tropical Meteorology (IITM), Pune, have significantly enhanced the Ministry of Earth Sciences' overall high-performance computing capacity.

(c)-(d) The Ministry of Earth Sciences has implemented various measures to strengthen disaster early warning systems for cyclones, heavy rainfall, and other extreme weather events across the country, including in Maharashtra. These measures are applicable across all seasons, including the ongoing southwest monsoon. The major initiatives are as follows:

- Augmentation of the observational network.
- Development of indigenous, technology-driven, and citizen-centric weather forecasting systems that strengthen disaster preparedness and improve public safety across India. IMD's in-house developed Decision Support System (DSS) is a major step in the direction of promoting self-reliance under the "Atmanirbhar Bharat" initiative. As a result, there is 40% improvement in forecast accuracy for all types of severe weather events in recent decades as compared to the previous decade.
- Impact-based forecasts and risk-based warnings are being disseminated at the district level, empowering authorities to take timely preventive actions against cyclones, heavy rainfall, thunderstorms, heatwaves, and cold waves.
- Developed "Mausamgram" (Har Har Mausam, Har Ghar Mausam), a unique citizen-focused platform providing location-specific, hyperlocal weather forecasts down to the village level. "Mausamgram" delivers hourly forecasts for the next 36 hours, three-hourly forecasts for the next five days, and six-hourly forecasts for up to ten days. Users can conveniently access weather information by searching through PIN code or location name, or by selecting the state, district, block, and gram panchayat. This user-friendly system ensures easy access to hyperlocal forecasts, enabling citizens to obtain accurate and timely weather updates tailored to their specific location.
- Development of climate hazard and vulnerability maps at the district level (<https://imdpune.gov.in/hazardatlas/index.html>)
- Development of geospatial services for weather forecast and warnings (<https://imdgeospatial.imd.gov.in/>)
- IMD is one of the agencies that generates Common Alert Protocol (CAP) alerts for severe weather warnings. These CAP alerts are disseminated through SMS as well as the SACHET app, developed by the NDMA. These CAP feeds are also being used by APPLE, GOOGLE, and GMAS for the dissemination of weather-related warnings. IMD has developed an Application Programming Interface (API), which is being used by various private and public organisations for further dissemination of IMD's forecasts and warnings to the general public through different media, including mobile apps developed by different stakeholders.
- IMD has developed various mobile apps for the dissemination of weather-related warnings, such as the MAUSAM App for weather forecasting and warnings, MEGHDOOT App for agro met services, DAMINI App for lightning warnings, and UMANG App for Weather forecasting and warnings.

To enhance the local relevance and last-mile dissemination of weather information in remote and vulnerable regions, the India Meteorological Department, in coordination with other Ministries and stakeholders, has implemented the following major initiatives to support disaster preparedness during cyclones, heavy rainfall, and other extreme weather events. These initiatives are applicable across all seasons, including the ongoing southwest monsoon.

- In collaboration with the Ministry of Panchayati Raj, IMD has developed the Panchayat Mausam Seva Portal, providing Panchayat-level weather forecasts through e-GramSwaraj (<https://egramswaraj.gov.in>), Meri Panchayat App, e-Manchitra, and Mausamgram (<https://mausamgram.imd.gov.in>).
- The mobile numbers of Panchayat Members, Ward Members, and Panchayat Secretaries have been integrated with the Panchayat Mausam Seva Portal, enabling the timely dissemination of weather forecasts and agrometeorological advisories through WhatsApp for further dissemination at the Gram Panchayat level.
- IMD also leverages the Krishi Sakhis and Pashu Sakhis network of the Ministry of Rural Development for last-mile dissemination of weather forecasts and agrometeorological advisories.
- IMD has organized over 7,300 Farmers' Awareness Programs (FAPs) across 373 districts, benefiting nearly 3.67 lakh farmers, including 83 Aspirational Districts, to promote climate-resilient agriculture and the effective use of weather-based advisory services.
- Under Mission Mausam, IMD has developed KALP (Krishi Advisory based on Location-specific Weather Prediction) for the generation of location-, crop- and crop-stage-specific advisories and Mausam SANKALP (Systematic Agrometeorological aNalytics, Knowledge and Advisory enabLing Platform) to strengthen weather analytics, advisory generation and climate-resilient agricultural planning.
- Timely alerts are transmitted in real-time to the Ministry of Home Affairs, the National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMAs), District Magistrates, health departments, and public utility sectors.
- A direct, real-time coordination mechanism is maintained with District Collectors, SDMAs, the Department of Agriculture, and other local stakeholders to ensure rapid ground-level dissemination and administrative preparedness.

Annexure-I

Current operational DWR network in the State of Maharashtra:

State	DWR location-wise
Maharashtra	Mumbai (S-Band)
Maharashtra	Nagpur (S-Band)
Maharashtra	Solapur (C-Band)
Maharashtra	Veravali (C-Band)
Maharashtra	Mumbai, Juhu (X-Band)
Maharashtra	Mumbai, Panvel (X-Band)
Maharashtra	Mumbai, Vasai, Virar (X-Band)
Maharashtra	Mahabaleshwar (X-Band)
Maharashtra	Mumbai, Kalyan, Dombivali (X-Band)
