

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION NO. 4433  
TO BE ANSWERED ON WEDNESDAY, 20<sup>TH</sup> AUGUST, 2025**

**PROGRESS REPORT OF MISSION MAUSAM**

4433. SMT. MALA RAJYA LAXMI SHAH:  
SHRI P P CHAUDHARY:  
SHRI VISHWESHWAR HEGDE KAGERI:  
SHRI VIJAY BAGHEL:  
MS KANGNA RANAUT:  
SHRI PRAVEEN PATEL:  
DR. NISHIKANT DUBEY:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the details of progress achieved under Mission Mausam in enhancing the accuracy and outreach of weather forecasting services across the country;
- (b) the manner in which the installation of Doppler Weather Radars and Automatic Weather Stations has contributed to improved real-time weather data collection and early warning systems;
- (c) whether the Doppler Weather Radars are equipped to predict extreme monsoon events and if so, the details thereof;
- (d) the details of impact of adopting advanced technologies such as high-resolution forecasting models and AI-based systems in strengthening climate prediction capabilities; and
- (e) the details of key national and international collaborations established under Mission Mausam to adopt global best practices in meteorological services and disaster risk reduction?

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

- (a) Mission Mausam is currently in the beginning phase of its implementation. However, once implemented, this project will help in the overall improvement of the short and medium-range weather forecast accuracy by about 5-10 %.
- (b) Radars, satellite products, and AWS/ARG are needed mainly for nowcast or for very short duration forecasts for improving location-based forecasts of likely occurrences of thunderstorms and heavy rainfall upto 6 hours. Worldwide, for issuing heavy rainfall forecasts and associated flash floods and other types of floods, weather predictions are made using various observational systems and then by running various NWP models. Presently, IMD has a very good observational network consisting of surface, upper air, and remote sensing (radar and satellite) observations. These observations are assimilated in various state-of-the-art regional and global numerical models to generate weather forecasts at different time scales. Radar observations help only in further tuning at the local scale in terms of nowcast of small-scale severe weather events, mainly used for nowcast purposes.

- (c) Doppler Weather Radars (DWRs) are vital tools equipped to detect, monitor, and support the prediction of extreme monsoon events. The DWR observations are available every ten minutes in the form of images with cloud types and their vertical developments over areas within the radar. So, it helps in monitoring and issuing nowcast warnings of thunderstorms, associated with heavy rainfall activities, at a very short duration of upto 3 hours.
- (d) The India Meteorological Department has been interacting and collaborating with other MoES institutions, and has undertaken several programmes towards Artificial Intelligence and Machine Learning (AI/ML) related research activities for application in the field of weather forecasting services. Some of them are given Annexure-1.
- (e) MoES institutions such as IMD, IITM, NCMRWF, etc., regularly coordinate with other developed countries regarding their technical advancement with respect to meteorological services and early warning systems, like Korea, Japan, the USA, UK, and other European countries. Knowledge-based practices are shared in this field through the exchange of visits of forecasters and scientists from various countries to India. Due to such regular interaction, India is moreover under the umbrella of Regional Specialised Meteorological Centres, Tropical Cyclone, Severe Weather, and climate services.

## **Annexure-1**

- Virtual Centre at IITM, Pune, has been established by MoES to develop AI/ML/DL based application tools.
- A dedicated functional group has been established in IMD under MoES to strengthen the R&D activities in AI/ML.
- IMD has established a specialized GPU and CPU-based infrastructure for AI computing.
- IMD has signed MoUs with various Academic Institutions like IITs, IIITs, NITs, ISRO, DRDO, Ministry of Electronics and Information Technology (MeitY), etc, for collaborations and R&D activities, utilizing facets of various AI/ML applications to weather and climate.
- The capacity-building in AI/ML domain with respect to weather and climate are being done by nominating scientists in training sessions and workshops.
- A short-term refresher course on Fundamentals of Artificial Intelligence and Machine Learning organized by IMD from 27th May 2024 to 31st May 2024.

The usage of AI-based monitoring tools and forecasting models is as follows:

- To Estimate Tropical Cyclone Intensity, satellite-based AI-enhanced Advanced Dvorak Technique (AiDT), as given by Cooperative Institute for Meteorological Satellite Studies, is utilised by IMD apart from other products.
- IMD also uses AI-based model guidance from the European Centre for Medium-Range Weather Forecasting (ECMWF) for tropical cyclone genesis, track, and intensity prediction.

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