GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 4465
TO BE ANSWERED ON WEDNESDAY, 20TH AUGUST, 2025

AI IN WEATHER FORECASTING

4465. MS. S JOTHIMANI:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government utilises AI technology to determine changes in season or weather conditions and if so, the details thereof;
(b) the details of efforts taken to forecast the weather and rain to farmers and fishermen using new technology;
(c) whether there is any upgradation taking place in technologies relevant to AI for weather forecasting; and
(d) if so, the details thereof and if not, the reasons therefor?

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

(a) Yes.The India Meteorological Department (IMD) and other MoES institutions have been using AI-based tools for experimental weather and climate forecasting. These include the Advanced Dvorak Technique (AiDT) used for estimate cyclone intensity, AI/ML-based foundation, hybrid (AI+Dynamical) models for weather prediction,etc.

The following are the research works done in AI/ML related to weather forecasts.

- Short-range global forecasting.
- Downscaling of precipitation data.
- Fire Location Forecasting.
- Fog Forecasting.
- Lightening/Thunderstorm Forecasts.
- Deep learning for improved global precipitation in a numerical weather prediction system.

In addition to the above research work, the MausamGPT (Mausam Generative Pre-trained Transformer), which is an AI-based chatbot trained explicitly as a climate service advisor to farmers and stakeholders also being developed.

(b) IMD has been using the latest technologies to provide early warning services to its stakeholders, like farmers, fishermen, etc. Last year, IMD, in collaboration with the Ministry of Panchayati Raj (MoPR), had launched Gram Panchayat Level Weather Forecasting (GPLWF) covering nearly all Gram Panchayats across India using a state-of-the-art multi-model ensemble forecast based on a number of numerical weather prediction models. These forecasts are accessible on digital platforms such as e-Gramswaraj (https://egramswaraj.gov.in/), the Meri panchayat app, e-Manchitra of MoPR, and Mausamgram of IMD (https://mausamgram.imd.gov.in/). The main aims and objectives of GPLWF are to provide weather forecasts up to Gram Panchayat Levels, covering critical parameters such as temperature, rainfall, humidity, wind, and cloud conditions-essential data that farmers need for informed decision-making regarding sowing, harvesting, and irrigation. The platform makes weather forecast information accessible anytime and anywhere at the panchayat level across the country. This weather information reaches a larger number of people through Pashu Sakhis and Krishi Sakhis under the Ministry of Agriculture and Farmers Welfare and the Ministry of Rural Development, as well as other Self Help Groups (SHGs). The GPLWF helps farmers to have access to localized weather information available hourly for up to a 36-hour lead period, 3-hourly from 36 hours to the next five days, and every 6 hours from the next 5 days to 10 days.

On 27 May 2025, the Government launched the indigenously built Bharat Forecasting System (BharatFS), a state-of-the-art numerical weather prediction model for generating high-resolution forecasts. It promises finer and accurate rain forecasts down to the panchayat/cluster of panchayats level. The BharatFS has a spatial resolution of 6km compared to the previous 12 km resolution of the global forecasting system (GFS). It also has a capability to provide predictions of rainfall upto 10 days, covering the short and medium range. Thus, it would help to provide a forecast at the panchayat/cluster of panchayats level for the public, farmers, disaster managers, and other stakeholders. The Climate Forecast System version 2 (CFSv2) coupled model is used for generating extended range weather forecasts (upto 4 weeks) at the meteorological sub-division level. Based on observed and forecasted weather, Agromet Field Units (AMFUs) covering 127 agroclimatic zones located at various SAUs, IITs, institutes of ICAR, etc., prepare Agromet Advisories twice a week (every Tuesday and Friday) in English as well as in Regional languages for their respective districts to help the farming community make appropriate decisions on day-to-day farm operations.

Along with the AAS bulletins, daily weather forecast and nowcast information are also issued by Regional Meteorological Centers (RMCs) and Meteorological Centers (MCs) of IMD. Impact-based forecasts (IBFs) and appropriate advisories for agriculture are also being prepared by AMFUs based on the severe weather warnings for different districts of various States and UTs across the country issued by the National Weather Forecasting Centre (NWFC), New Delhi, and RMCs and MCs of IMD.

Technological advancements have further enhanced accessibility, enabling farmers to receive location-specific forecasts and advisories through mobile apps such as ‘Meghdoot’, ‘Mausam’ and Social media platforms like WhatsApp, Facebook, etc. Additionally, IMD has integrated its services with the IT platforms of 18 State Governments, allowing farmers to access information in both English and regional languages.

(c)-(d) Yes. MoES recently augmented the High Power Computing System (HPCS) with a total computing capacity of ~22 PetaFLOPS, with about 10% of the total capacity of the new HPC systems having Graphics Processing Unit(GPU) (A100). Apart from this, MoES has a separate GPU's (NVIDIA H100) dedicated for AI/ML research in weather forecasting. IMD is working on AI/ML-based data driven model along with NWP models for further improving the weather forecasting skills over Indian region and the sea area of North Indian Ocean including the Bay of Bengal and the Arabian Sea in various spatio-temporal scales to make weather warnings more accurate, timely and actionable, helping communities to better prepare for and respond to weather hazards. The details are given in Annexure-1.

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.
- IMD organizes a short-term refresher course on the Fundamentals of Artificial Intelligence and Machine Learning every year in May.

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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