

PARLIAMENT QUESTION: AI AND GEOSPATIAL TECHNOLOGIES FOR WEATHER FORECASTING

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Through its Institutes, the Ministry of Earth Sciences (MoES) has operationalized three Artificial Intelligence (AI)-based global weather models that support forecasters in predicting severe weather events and improving forecast accuracy. Indigenous AI- and Machine Learning (ML)-based applications have also been developed by scientists at the Ministry to improve observational data processing, weather monitoring, and nowcasting of severe weather events, such as cyclones, heavy rainfall, and other natural disasters across the country, including Odisha.

Further, the India Meteorological Department (IMD), under the Ministry, has developed the Multi-Hazard Early Warning Decision Support System (MHEW-DSS), a Web-GIS-based platform for monitoring and forecasting severe weather events across the country, including Odisha. The platform is publicly accessible at the following URL: <https://imdgeospatial.imd.gov.in/>. The MHEW-DSS integrates geospatial technologies with meteorological observations, numerical weather prediction models, and impact-based forecasting to support timely decision-making for cyclones, heavy rainfall, thunderstorms, and other severe weather events. It brings together technology, data, and institutional coordination to strengthen the delivery of early warning services. Further, it is designed with an emphasis on scalability, interoperability, and user-centric delivery, enabling seamless operations across sectors and geographical regions. It also provides sector-specific advisories to Central and State Government authorities, disaster management agencies, communities, and industries, supporting preparedness for extreme weather events. By translating scientific forecasts into actionable alerts and advisories, the MHEW-DSS supports public safety, health, agriculture, energy management, and disaster preparedness.

Through its institutes, the Ministry of Earth Sciences has entered into MoUs and collaborative arrangements with various national organizations to promote technical and scientific cooperation, facilitate data sharing, and support research, education, and capacity-building initiatives. The details of the MoUs for collaborative research undertaken with institutions in Odisha are provided in the table below. MoES/Institutes, through MoUs, collaborate with academic and research institutions to advance research in monsoon science, weather and climate, ocean sciences, and allied areas to enhance weather and ocean-state forecasting capabilities.

S. No	Institutes/Organizations	MoU/ LoA
1	IMD, Mausam Bhawan, and Indira Gandhi Institute of Technology, Odisha	MoU

2	IMD and 'Siksha' O' Anusandhan Deemed University (SOADU), Odisha	MoU
3	MD and ICAR- Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha	MoU
4	MD and S. G. Foundation, Odisha	MoU
5	IMD and Orissa University of Agriculture and Technology, Bhubaneshwar, Odisha	LoA

The Ministry of Earth Sciences implements Central Sector Schemes uniformly across the country; therefore, funds are not allocated on a State/UT-wise basis. Financial assistance for research and collaborative activities is provided under various schemes and programs of the Ministry, based on approved proposals and the prescribed guidelines. Such support is extended to eligible academic and research institutions to undertake research, development, and capacity-building activities in areas falling within the Ministry's mandate.

The Government is implementing Mission Mausam, a Central Sector umbrella scheme of the Ministry of Earth Sciences (MoES), with the objective of making India a "Weather-ready and Climate-smart Nation". It aims to strengthen Earth System observations and prediction systems, improve early warnings for high-impact weather events, and deliver seamless weather and climate services, thereby enhancing climate resilience and disaster preparedness across the country, including in Odisha. Under Mission Mausam, the Ministry of Earth Sciences is strengthening the country's weather surveillance and atmospheric observation capabilities through the development and deployment of advanced technologies and higher-resolution observational systems, with improved temporal and spatial coverage, including in Odisha.

This information was given by the Minister of State (Independent Charge) for Earth Sciences Dr. Jitendra Singh in a written reply in Rajya Sabha today.

NKR/JKP

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