

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 2128
ANSWERED ON 06/08/2026

STRENGTHENING CYCLONE FORECASTING SYSTEMS

2128. SHRI DEBASHISH SAMANTARAY:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the steps taken to strengthen cyclone forecasting systems along India's east coast;
- (b) whether Odisha has benefited from the upgraded forecasting systems; and
- (c) the details of new technologies introduced?

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

- (a) The Ministry of Earth Sciences (MoES) has adopted advanced techniques and technologies to strengthen its weather monitoring and forecasting capabilities, including cyclone forecasting. These initiatives aim to enhance the accuracy of weather forecasts, enable the dissemination of timely early warnings and alerts at finer spatial scales, and extend the lead time available for preparedness and response. Several modernization initiatives have been undertaken to improve the accuracy and lead time of cyclone forecasting, particularly along India's east coast. The east coast of India, including West Bengal, Odisha, Andhra Pradesh & Tamil Nadu, has 10 Doppler Weather Radars (DWRs), 23 High Wind Speed Recorders (HWSRs), 23 Upper Air Observatories, 157 Automatic Weather Stations (AWSs), 345 Automatic Rain Gauges (ARGs), and 35 Agro-AWSs. In addition, under the district-wise and block-wise rainfall monitoring system, 1526 Rain Gauges are installed over the region. The details of DWRs along the east coast of India are given in Annexure-I.
- (b)-(c) Yes. During the last decade, the accuracy of forecasts for various severe weather events has improved by approximately 40–50% across the country, including Odisha, compared to the previous decade. Compared to the period 2020–2022, the forecast accuracy for cyclone track, intensity, and landfall point during 2023–2025 improved by 15-45%, 15-35%, and 10-30%, respectively, for forecast lead times of up to four days. In terms of death toll due to cyclones, since 2010, there has been a significant reduction in death toll due to landfalling cyclones not only in India but also in 13 countries bordering the Bay of Bengal and the Arabian Sea. These significant advancements have enhanced the global standing of India, the Ministry of Earth Sciences, and the India Meteorological Department (IMD), earning them international recognition, accolades, and appreciation.

Currently, there are 39 manned surface meteorological observatories, 35 AWSs, 167 ARGs, 10 Agro-AWSs, 6 HWSRs, 7 Upper Air Observatories, 3 DWRs (at Paradip, Sambalpur, and Gopalpur), Cyclone Warning Centre, and Agro-Meteorological Advisory Services Centre functional at Meteorological Center, Bhubaneswar, round the clock. Further, one C-Band has been installed at Balasore and one X-Band DWR at Bhubaneswar. In addition, parts of Odisha are currently covered by the DWRs in Visakhapatnam and Raipur.

IMD's cyclone forecasting and warning system is distinguished by its high accuracy in track and intensity prediction, achieved through the use of state-of-the-art numerical weather prediction models, multi-model ensemble, advanced data assimilation techniques, and continuous monitoring using satellites, DWRs, ocean buoys, coastal observational networks, and finally the in-house developed Decision Support System (DSS) for the generation of weather forecasts and warnings.

Annexure-I

Location-wise list of DWRs currently operational along the east coast of India:

S. No.	State/Union Territory	DWR Locations
1.	West Bengal	Kolkata (S-Band)
2.	Odisha	Gopalpur (S-Band)
3.	Odisha	Paradip (S-Band)
4.	Odisha	Sambalpur (C-Band)
5.	Andhra Pradesh	Machilipatnam (S-Band)
6.	Andhra Pradesh	Visakhapatnam (S-Band)
7.	Andhra Pradesh	Sriharikota (S-Band)
8.	Tamil Nadu	Chennai (S-Band)
9.	Tamil Nadu	Karaikal (S-Band)
10.	Tamil Nadu	Chennai (X-Band)
