RECENT INITIATIVES

- **Doppler Weather Radar (DWR) installed at Kochi and Gopalpur :** Inauguration of S-Band Polarimetric Doppler Weather Radar at Kochi in July was done by Hon'ble Minister of Earth Sciences, Science & Technology and Environment, Forests & Climate Change Dr. Harsh Vardhan. Installation of S-Band Polarimetric Doppler Weather Radar at Gopalpur by ISRO - Bharat Electronics Limited (BEL) has also been completed during the year 2017.

- Implementation of Integrated Himalayan Meteorology Project (IHMP) for installation of 10 nos. of X-Band Doppler Weather Radars in the states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand are in process.

- Commissioning of 11 nos. of C-Band Polarimetric Doppler Weather Radars to enhance the observational capacity of the IMD Radar network are also in process.

- **Agro-Meteorological Advisory Services (AAS):** Agro-Meteorological Advisory Services are disseminated under PPP mode and through Kisan Portal to 21.69 million farmers.

UP-GRADATION OF NWP MODELLING - IMD

The up-gradation of different NWP modeling components in IMD was achieved through joint efforts of various organizations of the Ministry of Earth Sciences such as **:** IMD, IITM, NCMRWF and INCOIS to improve the weather forecasting services.

- The **Global Forecasting System (GFS)** (V13.0.3) at T1534L64 (~12 km) in horizontal resolution and 64 hybrid sigma-Pressure layers with the top layer centred around 0.27 hPa (approximately 55 km) was made operational on December, 2016 for short to medium range weather forecast.
- During 2017 IMD implemented **Global Ensemble Forecasting System (GEFS SL)** for ensemble forecasts in the medium range time scale. The GEFS SL at semi-Lagrangian resolution T574 in horizontal resolution (~ 25 km) with 64 hybrid sigma-pressure layers was made operational in May, 2017. It is run once in a day (0000 UTC) with 20 members (and 1 control) to give ensemble mean and probabilistic forecast in the short to medium range. The initial conditions are generated from the NCEP based Ensemble Kalman Filter (EnKF) component of hybrid Global Data Assimilation System (GDAS).
- Implementation of suite of **coupled models** based on the Climate Forecast System version 2 (CFSv2) at different resolutions (CFSv2_T382; CFSv2_T126; GFSbc_T382; GFSbc_T126) for the operational **Extended Range Forecast (ERF) (up to 3 to 4 weeks)** to different users. The Multi-model ensemble (MME) out of 16 members run operationally for 32 days based on every Wednesday initial condition along with the hindcast run for 14 years (2003-2016) is used for preparing the ERF forecast for 4 weeks on every Thursday.
- The triple nested (18, 6 and 2 km) version (v3.7.1) of **Hurricane Weather Research Forecasting (HWRF)** model with its various diagnostic products has been run operationally established with 6 hourly intervals for the cyclones over North Indian Ocean.

HIGHLIGHTS

- Hon'ble Prime Minister of India in his Mann Ki Baat dated the 31st July, 2017 appreciated weather forecasting services of India Meteorological Department (IMD) and urged the public to use more and more weather forecasts to reduce losses. Extract from his address is as follows: *"Weather forecasts are available these days and the concerned technology has become so advanced these days, and space science also plays a very big role so that these weather forecasts turn out to be mostly accurate now. We should also gradually make it our nature to set our work patterns according to the weather predictions, which could safeguard us against losses".*

- Farmers database of 2.96 Crore has been collected for dissemination of advisory through SMS by the Agromet Advisory Services Division of IMD.

- A mobile app has been developed by Kerala IT mission in coordination with IMD for dissemination of weather services viz., daily weather, forecast, warnings and district wise Agromet advisories for public and farmers.

- 12 Indian Navy ships were recruited in Indian Voluntary Observing Fleet by Port Meteorological Office Mumbai on 10th February, 2017.

- The meteorological support is provided in terms of "Quantitative Precipitation Forecast (QPF)" through 14 Flood Meteorological Offices (FMOs) of IMD to Flood Forecasting Divisions (FFDs) of Central Water Commission (CWC) to issue "Flood warnings/Flood alerts". Also, during the year 2017, design storm studies of thirty seven (37) projects have been completed by Hydromet Division of IMD.

- About 8.5 lakhs analysed weather charts have been photographed and stored on NAS to enable access by remote users. These charts are being catalogued on the basis of synoptic events under the plan scheme `Cataloguing of Analysed Weather Charts'.

- Generation of Gridded Data & on-line reception of Agromet Data: The data received from Agro-met observatories are scrutinized, archived and supplied to scientists, planners etc. through NDC, Pune.

The latest weather observations along with the forecasts are made available by IMD on android phones and tabs at the touch of a button.

For further details Kindly contact

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भारत मौसम विज्ञान विभाग

India Meteorological Department

1875 में स्थापित

(Established in 1875)

पृथ्वी विज्ञान मंत्रालय

Ministry of Earth Sciences

भारत सरकार

Government of India

Celebration of

143rd IMD Foundation Day

15th January, 2018

Doppler Weather Radar at Kochi

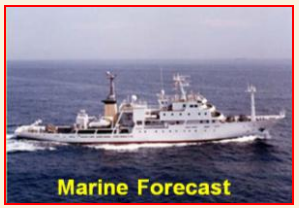
India Meteorological Department (IMD) is the National Meteorological Service of the country and the principal Government agency in all matters relating to Meteorology and allied disciplines and provides weather and climate services for public safety and socio-economic benefits.

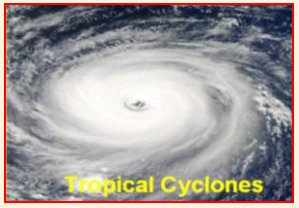
RECENT ACHIEVEMENTS

ESSO-IMD has been augmenting its observing system networks and communication systems during 2017 are given below:

- IMD has entered into an agreement with DRDO for development of laser based sensor for meteorological applications for measurement of clouds.
- Implementation of RMDCN-NG has given direct connectivity between six major international centres (RTH as well as GISC: Tokyo, Moscow, Beijing, Toulouse, Exter, Offenbach) for data exchange including DAR (Data Access & Retrieval).
- Implementation of INSAT-3D data supply to NOAA through FTP service of RTH.
- An EUMETcast terrestrial Satellite data receiving system has been set-up at NCMRWF, Noida through an MOU signed between IMD and EUMETSAT.
- Established VPN tunnel over internet with Myanmar, Naval Met Kochi, AWS (SI Pune), Mirror RTH Pune, UK Met office and DWD Germany.
- Established a new link with DHMS Bhutan for the first time for successful data exchange of Bhutan over GTS *via* RTH New Delhi.
- Established FTP link with JMA Tokyo for exchange of "WMO RARS radiance Data", "MTSAT Clear Sky Radiance (CSR)" and "IMD's RARS data" between RTH New Delhi and Tokyo and routing all the radiance data to NCMRWF/NWP.
- IMD has set up a countrywide network of 25 nos. Global Navigation Satellite System (GNSS) stations for "Earth and Atmospheric studies".
- Automated Weather Observing System (AWOS) was developed jointly by NAL and IMD has been successfully commissioned at Mangalore Airport in July, 2017 for measurement of Current Wx and Runway Visual Range (RVR).
- New Aeronautical Met. Station has been commissioned at Rohini (Delhi), Shirdi (Maharashtra) & Kishangarh (Rajasthan).
- Three numbers of Transmissometers were commissioned at different airports (2 in Kolkata and 1 in Mangalore).
- Two Cal/Val campaign for INSAT-3D satellite data calibration carried out at Bhuj, Gujarat by Joint team of IMD and SAC, ISRO Ahmadabad.
- Three hundred (300) AWS data logger systems have been provided to RMCs to upgrade with new version of data logger with dual communication-Satellite & GPRS.
- Two hundred (200) Digital Station Barometers (DSB) delivered to different RMCs and the installation completed.
- Electronic Sunshine recorders were installed at 12 World Radiation Data Centre (WRDC) network stations.
- Upgradation of Virtual Private Network (VPN) into MPLS-MNS links at 57 stations throughout the country.

WEATHER FORECASTING AND WARNING SERVICES FOR PUBLIC SAFETY & SOCIO- ECONOMIC BENEFITS





SATELLITE PRODUCTS FOR FORECASTING

The meteorological satellite data of INSAT is processed and disseminated by INSAT Meteorological Data Processing System (IMDPS) of India Meteorological Department (IMD). At present, Kalpana-1 (VHRR, DRT), and INSAT-3D (Imager, Sounder, DRT) satellites carrying meteorological payloads are supporting weather forecasting services. INSAT-3D Meteorological Data Processing System (IMDPS) was dedicated to the nation by the Hon'ble Minister of Science and Technology, Ministry of Earth Sciences on 15 January, 2014. The system is capable to receive and process the data of all two-existing geostationary meteorological satellites. The performance of the system during the current year has been maintained to the level of 98% operation efficiency (24 x 365 bases).

INSAT-3DR was launched successfully on 8th September, 2016 by GSLV -F05 and placed at 74 degree east in place of Kalpna-1 which has been shifted at 73.2-degree East. INSAT-3DR similar to INSAT-3D, is an advanced meteorological satellite of India configured with an imaging System and an Atmospheric Sounder. IMD is in action to establish Multi-Mission Meteorological Data Receiving and Processing System (MMDRPS) for INSAT-3D, INSAT-3DR and INSAT-3DS in collaboration with M/s Antrix Corporation Ltd, ISRO for which an MOU has been signed between IMD and ISRO on 6th March, 2017. The project is being monitored closely for implementation. At present the processed data of INSAT-3DR Imager and Sounder is being obtained from SAC, Ahmedabad through dedicated NKN connectivity and images generated at IMDPS and are disseminated on IMD website on real time basis.

Modified scan strategy of INSAT-3D and INSAT-3DR sounder payload has been implemented w. e. f. 12th August, 2017.

TROPICAL CYCLONE MONITORING AND PREDICTION

There were 10 cyclonic disturbances (depressions and cyclones) over the north Indian Ocean (NIO) and adjoining land regions during 2017 against the long period average (LPA) of 12 disturbances per year based on data of 1961-2015. Out of 10 CDs, 3 intensified into tropical cyclones against the normal frequency of 4.5 cyclones per year over north Indian Ocean (NIO) based on LPA. It included 1 cyclonic storms (CS), Maarutha, one severe cyclonic storm (SCS), Mora and one very severe cyclonic storm, Ockhi. These cyclones are:

- *Cyclonic storm*, Maarutha over Bay of Bengal (15-17 April)
- Cyclonic storm, Mora over Bay of Bengal (28-31 May)
- Very Severe Cyclonic Storm, Ockhi over Bay of Bengal (29 November to 5 December)

The annual average track forecast error during 2017 has been 61 km, 108 km and 190 km, respectively for 24, 48 and 72 hrs against the LPA (2012-16) error of 97, 149 and 203 km based on data of 2012-2016. The track forecast skill compared to CLIPER forecast during 2017 has been 68%, 77% and 76% respectively for the 24, 48 and 72 hrs lead period which is higher than LPA of 2012-2016 (54%, 67% & 71% respectively).