

**Ministry of Earth Sciences (MoES)**

**Govt of India**

**Summary of Important Developments –December, 2022**

**1. Important policy decisions taken and major achievements during the month:**

Provided in Annex-I.

**2. Important policy matters held up on account of prolonged Inter-Ministerial consultations:**

Nil

**3. No. of cases of 'sanction for prosecution' pending for more than three months:**

Nil

**4. Particulars of cases in which there has been a departure from the Transaction of Business Rules or established policy of the Government:**

Nil

**5. Status of ongoing Swachhta Abhiyan (progress under Special Campaign):**

Routine cleaning of the campus.

**6. Status of Rationalization of Autonomous Bodies:**

The Cabinet in its meeting on 13<sup>th</sup> July 2022 approved the merging of 5 Autonomous Bodies under MoES to one Autonomous Body.

**7. Information on specific steps taken for utilization of the Space Technology based tools and applications in Governance and Development:**

Potential Fishing Zone advisories are generated using the satellite derived parameters viz., Sea Surface Temperature, and Chlorophyll. Further, data from Global satellite data are used on continuous basis for generating short range and medium range weather forecasts.

**8. Vacancy position of senior level appointments in the Ministry/ Department, including Autonomous Bodies/ PSUs:**

It is confirmed that the incumbency details of all the posts in the Ministry/Department and its organizations falling under the purview of the ACC have been updated on AVMS and are placed at Annex-II.

**9. List of cases in which ACC (Appointments Committee of Cabinet) directions have not been compiled with:**

It is confirmed that the directions of ACC are complied with.

**10. Details of FDI Proposals cleared during the month and status of FDI proposals awaiting approval in the Ministry/ Department:**

Not Applicable.

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**Important policy decision taken and major achievements:**

- During the upcoming winter season (January to March 2023) the rainfall over the Northwest India consisting of seven meteorological subdivisions (Uttar Pradesh, Uttarakhand, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir and Ladakh) is most likely to be below normal (< 86 % of Long Period Average (LPA)).
- During January 2023, monthly minimum temperatures are most likely to be below-normal over many parts of central India and adjoining areas of peninsular, east and northwest India. Above normal to normal minimum temperatures are most likely over southern parts of south Peninsula, many parts of northeast India and some parts of northwest India.
- During 2022, 15 cyclonic disturbances (CDs) developed over the North Indian Ocean (NIO). There were 12 depressions, 1 cyclonic storm and 2 severe cyclonic storms.
- High resolution bathymetry and photographic survey of the Polymetallic Nodule Site in Central Indian Ocean was conducted at 5271 metres water depth using deep water Autonomous Underwater Vehicle 'Ocean Mineral Explorer' (OME).
- The Voyage team for the 42<sup>nd</sup> Indian Scientific Expedition to Antarctica (42-ISEA), comprising 23 members commenced their onward journey to Antarctica via Cape Town in 3 different batches.
- Indian National Centre for Ocean Information Services (INCOIS) participated in 25<sup>th</sup> Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/ IOTWMS) Communication Test on 7th December 2022 and issued test bulletins to 25 Indian Ocean rim countries as a Tsunami Service Provider (TSP).
- Honourable Minister for Fisheries, Kerala Government visited the site and interacted with National Institute of Ocean Technology (NIOT) and Kerala State Coastal Area Development Corporation (KSCADC) officials regarding Shore Protection work for Poonthura.

- Centre for Marine Living Resources and Ecology (CMLRE) has reached the milestone of 100<sup>th</sup> new faunal discovery which includes 34 new species and 66 new geographical records.
- Odisha University of Agriculture and Technology conferred Honorary Doctor of Science to Dr. Mrutyunjay Mohapatra, Director General of Meteorology, India Meteorological Department for “his outstanding contribution”.
- A Memorandum of Understanding (MoU) has been signed between India Meteorological Department (IMD) and Defence Geoinformatics Research Establishment (DGRE) regarding installation of X-band Doppler Weather Radar at Banihal Top on 19th December, 2022.
- A MoU has been signed between IMD and Andhra University, Visakhapatnam to enhance the research between the two organizations.

There was no matter pending before the Cabinet requiring decision/approval.

Minimum Government, Maximum Governance:

- Dissemination of Agromet Advisories to user communities through SMS and IVR technology is continued in the country through Kisan Portal and under PPP (Public Private Partnership) mode. Presently, about 7.6 million farmers in the country are getting advisories directly.
- Adverse-weather SMS warnings are being sent through mobile to the State Government officials / Disaster-related officials / Central Government organizations/common man.
- Daily forecast along with warning and city forecast for many cities are disseminated through email to all users including state authorities, electronic and print media.

## Atmospheric Observation Systems Network

Observation Type	Commissioned so far	Installations during the month	Data Reporting
Automatic Weather Station (AWS)	*464	2	464
Automatic Rain Gauge (ARG)	525**	--	525
Agro AWS	200	--	194
GPS Sonde based RS/RW Stns.	56	--	56
Doppler Weather Radar (DWR)	*** 37	--	30
Ozone (Ozone Sonde + Total Ozone)	02	--	02
Surface Ozone ( <u>Electrochemical Concentration Cell</u> method)	07	--	05
Nephelometer	12	--	09
Sky Radiometer	20	--	16
Black Carbon Monitoring Systems (Aethalometer)	25	--	15
Air Quality Monitoring System (SAFAR)	10 (Delhi) 10 (Mumbai) 10 (Ahmedabad)	--	09 (Delhi) NIL (Mumbai)**** NIL (Ahmedabad)
Hydromet. (IMD & Extra-departmental excluding AWS & ARG)	---	--	3091
Aviation	79	--	79
Radiation Stations	46	---	46

\* Out of Total 808 commissioned, 344 are outlived.

\*\* Out of total 1382 commissioned, 857 are outlived.

\*\*\* Including 2 Doppler Weather Radar of Indian Space Research Organization (ISRO).

\*\*\*\* Contract with the firm is not renewed.

## **Modelling**

During December 2022, every week on Thursdays, National Centre for Medium Range Weather Forecasting (NCMRWF) coupled model based Extended Range Prediction (ERP) for four weeks for rainfall, surface temperature and winds (full fields and anomalies) were provided in real-time to (i) Long-range forecast and Agri-Met divisions of IMD, (ii) Indian Institute of Tropical Meteorology (IITM) ERP group, (iii) Space Applications Centre (SAC), (iv) Defence Geo-informatics Research Establishment (DGRE), (v) Indian Air Force (IAF), (vi) Navy, (vii) Geological Survey of India (GSI), (viii) National Institute of Hydrology (NIH), (ix) All regional centres of IMD and (x) Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) countries Met Departments. Additionally, snow forecasts were provided to Defence Research and Development Organisation (DRDO) and IAF for use at their end. On the last Thursday of the month, i.e., on 29<sup>th</sup> Dec 2022 the monthly mean forecast valid for January 2023 were also included for the users.

## **Monthly Weather Summary (December 2022)**

### **a) Important Weather Events during the month**

#### Low Pressure Systems:

Cyclone Mandous developed from a low pressure area (LPA) that formed over South Andaman Sea & neighbourhood on 5<sup>th</sup> December, 2022. A low pressure area formed over southeast Bay of Bengal and adjoining equatorial India Ocean on 14<sup>th</sup> December.

#### Cold Wave:

Cold Wave spell reported from 19 Dec 2022 onwards and Cold day spell from 21 Dec 2022 over northwest India (particularly Punjab, Haryana, Chandigarh, Delhi and north Rajasthan) with intensification during 25-27 Dec 2022 and significant reduction since 29<sup>th</sup> Dec 2022.

#### Western Disturbances:

A total of 7 Western Disturbances (WDs) moved across north India during the month. Out of that, one WD (i.e. the last WD of 28-30 Dec) caused rain /snowfall over Western Himalayan Region and rainfall over adjoining plains of northwest India.

Other 6 WDs were feeble (during 2-4, 6-8, 11-15 (this WD interacted with Severe Cyclonic Storm MANDOUS and its remnant), 17-21 and 22-24 Dec) and were positioned to the north and did not affect the region.

Fog:

Dense to Very Dense Fog Occurrences during the month are Punjab: 18-28 Dec: widespread fog, Haryana and Chandigarh: 18-29 Dec: scattered to fairly widespread fog, Delhi: 18-27 Dec: scattered to fairly widespread fog, Northwest Rajasthan: 18-27 Dec: scattered to fairly widespread fog, Uttar Pradesh: 17- 30 Dec: scattered to fairly widespread fog, Jammu and Uttarakhand: 24-27 Dec: scattered to fairly widespread fog, Himachal Pradesh-22-24 Dec: scattered to fairly widespread fog.

**b) Rainfall Scenario:**

The rainfall for the country as a whole, for the Post-Monsoon -2022 has been recorded as 144.1 mm which is 119% of its Long Period Average (LPA) of 121.0 mm.

**c) Heavy Rainfall Events:**

Warning issued for	No. of Heavy/Very Heavy Rainfall Events (>64.4 mm): 330
	Percentage correct (in %) for Rainfall >64.4mm
Day1 / 24 Hours	98
Day2 / 48 Hours	97
Day3 / 72 Hours	97

**d) Temperature Scenario:**

The mean temperature for the month of December-2022 for the country as a whole was 21.55°C which was above normal by +1.06°C. The highest maximum temperature of 37.1°C had been recorded at Mangalore (Coastal Karnataka) on 27th December 2022 and the lowest minimum temperature of 0.0°C had been recorded at Churu (West Rajasthan) on 26<sup>th</sup> December 2022 over the plains of the country during the month.

**e) Thunder Squall & Hailstorm activity:**

Thunder squall & Hailstorm activity during the month (till 0830 IST of last date of the month) is given in the table below:

S. No.	Region	Thunder Storm Days	Hail Events	Squall Events	Dust storms
1.	South Peninsular India	15	Nil	Nil	Nil
2.	Northwest India	02	Nil	Nil	Nil
3.	Northeast India	02	Nil	Nil	Nil
4.	East India	03	Nil	Nil	Nil
5.	Central India	02	Nil	Nil	Nil
6.	West India	02	Nil	Nil	Nil

**Bulletins/Warnings/Press Releases Issued:**

All India Weather Bulletins:- 124, All India inference and severe weather warnings:- 124, All India Weekly Weather Reports:- 5, Daily guidance under Tropical Cyclone Forecasting Programme: 31, Extended Range Outlook for Cyclogenesis:- 5, Mountain weather bulletins issued for western and central Himalayan region:- 62, Marine Weather Bulletins:- 62, Severe weather guidance for next 5 days about heavy rain, strong winds, high waves & storm surge: 31, Nowcast Guidance Bulletins for Severe Weather:- 31, Press Releases issued during the month:- 42.

**Publications & Operational Reports:**

1. Climate Diagnostic Bulletin for July and August 2022 has been published and uploaded on the website.
2. Computed gridded Standardized Precipitation Index (SPI) & Standard Precipitation Evaporation Index (SPEI) at 0.5\*0.5 degree resolution at 4



weekly, 1, 2, 3, & 4 monthly time scales. Uploaded the maps of the aforementioned timescales at weekly basis on IMD Pune website.

3. Five weekly Aridity Anomaly Maps for the period 24<sup>th</sup> to 30<sup>th</sup> November, 01<sup>st</sup> to 07<sup>th</sup>, 08<sup>th</sup> to 14<sup>th</sup>, 15<sup>th</sup> to 21<sup>st</sup> and 22<sup>nd</sup> to 28<sup>th</sup> December 2022 have been prepared, mailed to Agrimet for Agromet Advisory Services and uploaded on IMD Website.
4. Five Biweekly Aridity Anomaly Maps for the period 17<sup>th</sup> to 30<sup>th</sup> November, 24<sup>th</sup> November to 07<sup>th</sup> December, 01<sup>st</sup> to 14<sup>th</sup>, 08<sup>th</sup> to 21<sup>st</sup> and 15<sup>th</sup> to 28<sup>th</sup> December 2022 have been prepared and uploaded on IMD Website.
5. Five weekly Aridity Anomaly Outlook Maps for the period 01<sup>st</sup> to 07<sup>th</sup>, 08<sup>th</sup> to 14<sup>th</sup>, 15<sup>th</sup> to 21<sup>st</sup>, 22<sup>nd</sup> to 28<sup>th</sup> and 29<sup>th</sup> December 2022 to 04<sup>th</sup> January 2023 have been prepared and uploaded on IMD Website.
6. Monthly Aridity Anomaly Maps for the period November and October to November Cumulative 2022 have been prepared and uploaded on IMD Website.

**Seismological Observational Network:**

Observation Type	Target	Commissioned so far	Data reporting during the month
Seismic stations	115	152	128

**Earthquake and Tsunami monitoring**

Earthquake:

113 earthquakes were monitored in the Indian region out of which 2 events were greater than the magnitude (M) of 5.0.

Tsunami:

No seabed earthquakes (M>6) with a potential to generate tsunami have occurred during the month.

### Ocean Observation System

Type of Platform	Target	Commissioned till December, 2022	Data received during December, 2022
Argo Floats *	200	374	51
Moored Buoys	16	19	5
Tide Gauges	36	36	32
High Frequency (HF) Radars	10	12	6
Acoustic Doppler Current Profiler (ADCP)	20	20	17
Tsunami Buoys	4	7	2
Wave Rider Buoy	23	16	12

\*The remaining floats/drifters have completed their life time and as such no data can be received from them.

### Ocean Science Services

S. No	Types of forecasts	No. of advisories issued during the month
1.	Integrated Potential Fishing Zone (PFZ) advisories (Sea Surface Temperature (SST), Chlorophyll., wind)	30
2.	Tuna Fishing Advisories	9
3.	Ocean State Forecast (OSF)-Wave, Wind, Currents, SST (Sea Surface Temperature), MLD (Mixed Layer Depth) and D20 forecasts	30
4.	Real time global ocean analysis (daily)	31
5.	Coral Bleaching Alert System	10

## **Outreach and Awareness**

- One (1) Oil Spill Trajectory advisory was provided by INCOIS to the Republic of Mauritius on the Yu Feng vessel wreckage St Brandon Island, Mauritius on 20 December 2022.
- Students from various schools & colleges visited the INCOIS campus.
- A workshop for prospective scientific drilling in the Andaman region (based on tectonics component) was organized at National Centre for Polar and Ocean Research (NCPOR) Goa during December 13-14, 2022. Two days of scientific deliberations culminated into formulation of important scientific questions that could be answered through a deep sea drilling endeavor in Andaman region.
- World Meteorological Office (WMO) El Niño/La Niña Southern Oscillation (ENSO) workshop entitled “Scoping Workshop on the WMO recognized entity supporting El Niño/La Niña information”, was held at Indian Institute of Tropical Meteorology (IITM)Pune during 6-8 December 2022.
- 5 days training programme for Indian Air Force Officers was conducted at IITM, Pune during 12-16 December 2022. The participants were taken to study tour to High Altitude Cloud Physics Laboratory (HACPL), Mahabaleshwar on 15 December 2022.
- Mr. Soumya Samanta, IITM has received the award for Best Paper on Monsoon Research for 2020-2021, by the Indian Meteorological Society (IMS) for the paper "The lifecycle of a stationary cloud cluster during the Indian Summer Monsoon: A microphysical investigation using polarimetric C-Band radar”, Monthly Weather Review.
- Bhupendra Bahadur Singh, IITM was awarded the Best Presenter Award (Professionals Category) at the International Conference on Climate Change-2022 (ICCC-2022) for his paper titled “Relation between rainfall and soil moisture variability during deficit and excess seasons over core monsoon zone of India”.
- Pooja Pawar, IITM was awarded "Certificate of Achievement" by the South Asia Nitrogen Hub and Maldives National University for an exceptional work and presenting a poster entitled "Chloride (HCl/Cl-) dominates inorganic

aerosol formation from ammonia in the Indo-Gangetic Plain during winter: modelling and comparison with observations" on 12 December 2022.

- Dr. Rosimitha Panda, IITM secured the Best Poster Award for the paper titled "Study of the Indian Summer Monsoon for two contrasting years using Weather Research and Forecasting (WRF) Model" in the TROPMET-2022 at Indian Institutes of Science Education and Research (IISER), Bhopal.
- The delegation from Defence Department of United Arab Emirates visited IMD, New Delhi on 13<sup>th</sup>December to have an overview of cyclone warning services and weather forecasting services of Regional Specialised Meteorological Centre (RSMC), New Delhi/ IMD.
- IMD issued daily weather forecasting video of about 5 minutes duration in English & Hindi through YouTube, Facebook, Twitter and IMD website.
- Weekly video on extended range forecast (upto two weeks) were issued every Thursday through website and social media (Facebook, Twitter, YouTube etc.).
- Daily interviewed was provided by the forecasters within the country.
- The forecast videos in regional language were issued by regional offices of IMD regularly.
- Bulletins and Warnings along with graphics were also communicated through Social Media including Facebook, Twitter, Instagram, YouTube and IMD Blog page.

## **Publications**

Subject	Publications			Ph.Ds		
	April 22 – Nov 2022	Dec 22	Total	April 22 – Nov 2022	Dec 22	Total
Atmospheric Sciences	116	25	141	13	6	19
Ocean Science and Technology	58	11	69	4	1	5
Polar Sciences	20	1	21	-	-	-
Geosciences and resources	40	4	44	1	-	1
<b>Total</b>	<b>234</b>	<b>41</b>	<b>275</b>	<b>18</b>	<b>7</b>	<b>25</b>

**Utilization of Ocean Research Vessels during the month**

<b>Vessel</b>	<b>Days at Sea/ Utilization</b>	<b>Maintenance/ Inspection/Scientific Logistics/ Cruise Preparation</b>	<b>No. of Cruise</b>
Sagar Nidhi	29	2	2
Sagar Manjusha	22	9	2
Sagar Tara	16	15	2
Sagar Anveshika	8	23	1
Sagar Kanya	0	31	0
Sagar Sampada	0	31	0

No.MoES/20/01/2017-Estt.  
Government of India  
Ministry of Earth Sciences

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Dated, the 4 January, 2023

CERTIFICATE

(FOR THE MONTH OF DECEMBER, 2022)

It is certified that the detailed status regarding all the posts pertaining to Ministry of Earth Sciences have been updated on AVMS **as on last day of the month of December, 2022**. A summary of the status is given below:-

- |  |      |
|--|------|
| a. The total number of posts required to be entered on AVMS        | - 13 |
| b. Number of posts filled as on date                               | - 12 |
| c. Number of posts totally vacant as on date                       | - 01 |
| d. Number of posts under additional charge arrangement             | - 00 |
| e. Number of posts that would fall vacant during the next 6 months | - 00 |

  
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