

**Ministry of Earth Sciences (MoES)**

**Govt. of India**

**Summary of Important Developments – September, 2023**

**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. Efforts are underway to implement the same.

**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:**

- Hon'ble Union Minister of Earth Sciences chaired a meeting on 5<sup>th</sup> September 2023 to review of the ACROSS and OSMART schemes of MoES.
- IMD released "End of Monsoon Season Report" on 30<sup>th</sup> September 2023 with the following highlights:
  - Rainfall over the country as a whole during monsoon season (June-September), 2023 was 94% of its LPA.
  - Southwest monsoon currently advanced to the South Andaman Sea and Nicobar Islands. Monsoon withdrawal commenced from West Rajasthan on 25<sup>th</sup> September 2023 (with a delay of 8 days).
  - The forecast for monsoon onset over Kerala for this year was correct, which is the seventeenth consecutive correct forecast for this event except the year 2015 since the commencement of this forecast in 2005.
  - The Northeast Monsoon Season (October to December (OND)) 2023 rainfall over the south Peninsular India is most likely to be normal (88-112% of Long Period Average (LPA)).
  - Currently, El Niño conditions are prevailing over the equatorial Pacific region. At present the positive IOD conditions are prevailing over the Indian Ocean and the latest MMCFS forecast indicates that the positive Indian Ocean Dipole (IOD) conditions are likely to weaken by the end of year.
- During the month of September 2023, the country as a whole received excess rainfall (113% of Long Period Average (LPA)).
- India Meteorological Department (IMD) hosted the 2<sup>nd</sup> Meeting of World Meteorological Organization (WMO)'s Advisory Group on Severe Weather Forecasting (AG-SWF) Programme at New Delhi during 19 -21 September 2023 with experts from WMO and various severe weather forecasting centres across the globe. Under the Severe Weather Forecasting Programme (SWFP), the Regional Specialized Meteorological Centre (RSMC), New Delhi provides guidance and forecast every day, valid for next five days to nine member countries in South Asian region (Thailand, Myanmar, Bangladesh, Nepal, Bhutan, India, Sri Lanka, Maldives and Pakistan) since 2016.

- MoES conducted mega citizen-led beach clean-up drives at 79 locations in 8 coastal states and 4 UTs of the country on 16 September 2023 that continued on 17 September 2023 to mark International Coastal Clean-up Day.
- A Memorandum of Understanding (MoU) was signed between the Rajasthan State Pollution Control Board and the Indian Institute of Tropical Meteorology (IITM), Pune on 26<sup>th</sup> September 2023 to provide early warning and decision support for air quality management in Jaipur.
- A new dromiid crab species is described from the south-eastern Arabian Sea and southwestern Bay of Bengal, India at depths of 107–113 m. This is the second new species of *Epigodromia* McLay 1993 discovered in Indian waters.

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**

<b>Observation Type</b>	<b>Commissioned so far</b>	<b>Installations during the month</b>	<b>Data Reporting</b>
Automatic Weather Station (AWS)	*489	--	489
Automatic Rain Gauge (ARG)	**429	--	429
Agro AWS	200	--	193
GPS Sonde based RS/RWStns.	56	--	56

Observation Type	Commissioned so far	Installations during the month	Data Reporting
Doppler Weather Radar (DWR)	***40	--	31
Ozone (Ozone Sonde + Total Ozone)	02	--	02
Surface Ozone (Electrochemical Concentration Cell method)	07	--	05
Nephelometer	12	--	09
Sky Radiometer	20	--	17
Black Carbon Monitoring Systems (Aethalometer)	25	--	19
Air Quality Monitoring System (SAFAR)	10 (Delhi) 10 (Mumbai) 10 (Ahmedabad)	--	09 (Delhi) ****NIL (Mumbai) NIL (Ahmedabad)
Hydromet. (IMD & Extra-departmental excluding AWS & ARG)	---	--	3162
Aviation	100	01	100
Radiation Stations	47	---	47

\* Out of Total 808 commissioned, 319 are outlived.

\*\* Out of total 1382 commissioned, 953 are outlived.

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

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

## Modelling

During September 2023, 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 28<sup>th</sup> September 2023 the monthly mean forecast valid for October 2023 were also included for the users.

### **Monthly Weather Summary (September 2023)**

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

##### Low Pressure Systems:

During the month, five low pressure systems had formed. Among these 5 systems, 4 were formed over the Bay of Bengal and 1 was formed over the Arabian Sea. The low-pressure systems and their remnants sustained over the land for longer duration and thus supported the persistent rainfall activity over Central India and adjoining areas of west India and Peninsular India during the month.

##### Western Disturbances (WD):

A total of 2 Western Disturbances had affected Northwest India during the month.

#### **b) Rainfall Scenario:**

The rainfall for the country as a whole, for the month of September-2023 has been recorded as 190.0 mm which is 113% of its Long Period Average (LPA) of 167.9 mm.

#### **c) Heavy Rainfall Events:**

<b>Warning issued for</b>	<b>No. of Heavy/Very Heavy Rainfall Events (&gt;64.4 mm): 306</b>
	<b>Percentage correct (in %) for Rainfall &gt;64.4mm</b>
Day1 / 24 Hours	76
Day2 / 48 Hours	73
Day3 / 72 Hours	71

#### **d) Temperature Scenario:**

The mean temperature for the month of September-2023 for the country as a whole was 28.23°C which was above normal by +0.91°C which was the highest since 1901.

The maximum temperature of 43.5°C had been recorded at Jaisalmer (West Rajasthan) on 9th & 10th September 2023 and the minimum temperature of 16.0°C had been recorded at Raisen (West Madhya Pradesh) on 28th & 30th September 2023 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	24	Nil	Nil	Nil
2.	Northwest India	28	Nil	Nil	Nil
3.	Northeast India	29	Nil	Nil	Nil
4.	East India	30	Nil	Nil	Nil
5.	Central India	30	Nil	Nil	Nil
6.	West India	10	Nil	Nil	Nil

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

All India Weather Bulletins:- 120, All India inference and severe weather warnings:- 120, All India Weekly Weather Reports:- 4, Daily Tropical Weather Outlook with cyclogenesis forecast for next 5 days: 29, National bulletins for National disaster managers and general public: 6, Regional Specialized Meteorological Centre (RSMC) bulletins for WMO, WMO/ Economic and Social Commission for Asia and the Pacific (ESCAP) Panel on Tropical Cyclones: 6, Daily Severe Weather Guidance for next 5 days under Severe Weather Forecasting Programme: 30, Severe Weather Advisory Bulletins for nowcast guidance: 30, Weekly Extended Range Outlook for Cyclogenesis for next 2 weeks: 4, Daily Warnings for Fishermen in North Indian Ocean for next 5 days: 30, Fleet Forecast for Indian Navy for next 12 hours: 60, Bulletins for ships in deep sea under Global Maritime Distress Safety System for next 36 hours: 60, Mountain weather bulletins issued for western and central Himalayan region:- 60, Mountain Expedition Forecast Bulletins issued for : Mt. Mana Expedition conducted by Indian Army (50(I) Parachute (PARA) Brigade): 14, Mt. Trishul Mountaineering Expedition conducted by Kumaon regiment: 21, Mt. Rudragaira Mountaineering expedition by SSB: 14, Mt. Thelu Mountaineering Expedition by National Cadet Corps

(NCC): 7, Mt Kangto-6 Mountaineering Expedition by Army Adventure wing: 15, Mt. Kang Yatse Mountaineering Expedition By Army Adventure wing: 6, Mt. Kun Mountaineering Expedition by High Altitude Warfare: 12, Manaslu Mountaineering Expedition By Border Security Force (BSF): 11, Mt. Jongsong Mountaineering Expedition by National Institute of Mountaineering and Adventure Sports (NIMAS): 10, Mt. Nun Mountaineering Expedition By Army Adventure wing: 9, Mt. Bhagirathi-II Mountaineering Expedition By International Mountain Summit (IMS): 3, Mt. Jogin Mountaineering Expedition By Jammu and Kashmir Rifles (JAK RIF): 2, Sar Pass Parvati Valley Expedition by 5 Armored Regiment of Indian Army: 2, Current Temperature Status and Heat Wave Warning bulletins:-30, Press Releases issued during the month:- 39.

### **Publications & Operational Reports:**

1. Climate Diagnostic Bulletin for May, June, July and Pre-monsoon season 2023 has been published and uploaded on the website.
2. Climate Summary for the month of August 2023 Issued.
3. El Nino Southern Oscillation (ENSO) bulletin for the month of September 2023 and Seasonal Climate Outlook for South Asia for the period of September to December 2023 were issued.

Quick Link:

[https://imdpune.gov.in/cmpg/Product/ENSO\\_Bulletin/ENSO\\_IOD\\_Update\\_Bulletin\\_9\\_23.pdf](https://imdpune.gov.in/cmpg/Product/ENSO_Bulletin/ENSO_IOD_Update_Bulletin_9_23.pdf)

4. Digital Current Weather Indication System (DCWIS) and Present Weather Detector (PWD) systems were installed at Coochbehar airport (Runway (RWY) 22) during 31.08.2023 to 04.09.2023
5. DCWIS and PWD systems were installed at Vadodara airport (RWY 22) during 05.09.2023 to 11.09.2023
6. DCWIS & PWD systems was installed at Jharsuguda airport (RWY 24) during 07.09.2023 to 12.09.2023
7. DCWIS & PWD systems were installed at Trichy airport (RWY 09/27)
8. DCWIS & PWD systems were installed at Azamgarh airport (RWY 14).
9. Doppler Weather Radar (DWR) at Lansdowne is installed and commissioned on 24.09.2023.



### Seismological Observational Network:

Observation Type	Commissioned so far	Data reporting during the month
Seismic stations	153	118

### Earthquake and Tsunami monitoring

#### Earthquake:

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

#### Tsunami:

3 seabed earthquakes (M>6) with a potential to generate tsunami have occurred during the month. These informations were provided in less than 12 minutes of occurrence of the events.

### Ocean Observation System

Type of Platform	Commissioned till during the month	Data received during the month
Argo Floats	87	49
Moored Buoys	19	17
Tide Gauges	36	33
High Frequency (HF) Radars	10	8
Acoustic Doppler Current Profiler (ADCP)	20	17
Tsunami Buoys	7	4
Wave Rider Buoy	16	11

### 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)	31
2.	Tuna Fishing Advisories	3
3.	Ocean State Forecast (OSF)-Wave, Wind, Currents, SST (Sea Surface Temperature), MLD (Mixed Layer Depth) and D20 forecasts	31
4.	Real time global ocean analysis (daily)	31

S. No.	Types of forecasts	No. of advisories issued during the month
5.	Coral Bleaching Alert System	10

### **Outreach and Awareness**

- The Ministry of Earth Sciences (MoES) conducted mega citizen-led beach clean-up drives at 79 locations in 8 coastal states and 4 UTs of the country on 16 September 2023 that continued on 17 September 2023 to mark International Coastal Clean-up Day.
- National Centre for Medium Range Weather Forecasting (NCMRWF) organized a day-long visit of 30 IAF Officers for familiarization with NWP models and data assimilation on 21<sup>st</sup> Sept 2023.
- An experimental setup based on a Recirculatory Aquaculture System (RAS) has been established by Centre for Marine Living Resources and Ecology (CMLRE) for conducting artificial fish propagation trials with marine ornamental fishes using synthetic seawater. RAS facilities provide enhanced control over water quality, temperature, and other environmental parameters, making them well-suited for a variety of research and commercial aquaculture applications.
- The International Training Centre for Operational Oceanography (ITCOcean) at Indian National Centre for Ocean Information Services (INCOIS) organized the following programs:
  - One-day Operational Services course for trainees from the "Centre for Space Science and Technology Education in Asia and the Pacific" (CSSTEAP), Indian Institute of Remote Sensing (IIRS), Dehradun, and National Remote Sensing Centre (NRSC), Hyderabad.
  - Training program for officers from the Nuclear Power Corporation of India on various operational aspects of the Indian Ocean Tsunami Early System, Storm Surge, Ocean State, and Vulnerability mapping services operating from INCOIS.
  - Training program on Sea Glider instrumentation, testing, data processing and analysis.
  - International training Course & Hack Week on "Machine Learning based Species Distribution Modelling." The training was attended by 58 trainees from India, Sri Lanka, Bangladesh, and Uganda.

- In preparation for the Indian Ocean Wave 2023 (IOWave23) tsunami exercise scheduled in October 2023, INCOIS, in collaboration with the National Disaster Management Authority (NDMA), organized a Pre-IOWave23 Workshop on 'Tsunami Standard Operating Procedure'. A total of 55 participants attended the workshop from various organizations.
- Students from various colleges/ institutes/ universities/ schools visited INCOIS and IITM.
- INCOIS introduced the Online Oil Spill Advisory (OOSA v 4.0) to Indian Coast Guard officers & marine environment stakeholders during the IMO Level-1 training course conducted by Indian Coast Guard at Chennai from 11-15 September 2023.
- INCOIS provided weekly updates including past week briefing and upcoming week forecast of Ocean State Forecast information (Wave, Wind, Current, Swell, Sea Surface Temperature) for the Indian Ocean to South Asia Hydromet Forum (SAHF) which is administrated by Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES).
- One hundred and thirty-five (135) High wave/Swell Surge Alert/ Rough Sea Alert were issued to West and East Coast of India, Andaman & Nicobar Islands by INCOIS.
- Thirty-one (31) days of Algal Bloom Information Service were issued, and one day alerts were generated by INCOIS.
- IITM Hub of International Conference on Regional Climate – Coordinated Regional Climate Downscaling Experiment 2023 (ICRC-CORDEX 2023) was successfully organized in a hybrid mode, at Indian Institute of Tropical Meteorology, Pune & Trieste, Italy, during 25-29 September 2023. It was attended by 67 offline (in person) participants and 36 online participants.
- IMD conducted Pre-cyclone exercise and preparedness Meeting for the cyclone season (April-June) on 29th September, 2023. About 280 participants from different organisations attended.
- India Meteorological Department (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.).
- 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.		
	Apr 2023 – Aug 2023	Sep 2023	Total	Apr 2023 – Aug 2023	Sep 2023	Total
Atmospheric Sciences	66	14	80	7	1	8
Ocean Science and Technology	42	9	51	2	0	2
Polar Sciences	11	3	14	0	0	0
Geosciences and resources	24	4	28	4	1	5
<b>Total</b>	<b>143</b>	<b>30</b>	<b>173</b>	<b>13</b>	<b>2</b>	<b>15</b>

### **Patents: 1**

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

Vessel	Days at Sea/ Utilization	Maintenance/ Inspection/ Scientific Logistics/ Cruise Preparation	No. of Cruises
Sagar Nidhi	26	4	2
Sagar Manjusha	28	2	2
Sagar Tara	18	12	3
Sagar Anveshika	12	18	1
Sagar Kanya	0	30	0
Sagar Sampada	0	30	0

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

Prithvi Bhavan, Lodhi Road  
New Delhi-110 003  
Dated, the October, 2023

**CERTIFICATE  
(FOR THE MONTH OF September, 2023)**

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 September, 2023. 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	–	10
c. Number of posts totally vacant as on date	–	02
d. Number of posts under additional charge arrangement	–	01
e. Number of posts that would fall vacant during the next 6 months	–	01



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