

Ministry of Earth Sciences (MoES)
Summary of Important Developments –March, 2017

1. **Important policy decisions taken and major achievements during the month:** Provided in Annex I.

2. **Important policy aspects / matters held up on account of prolonged Inter- Ministerial consultations/ delays, etc.:** Nil

3. **Compliance of COS decisions:**

S.No.	Number of COS decisions pending for compliance	Proposed action plan/timelines	Remarks
1.	Dt 14/08/2014 PROPOSAL FOR KRILL FISHING MoES, in collaboration with MEA, will study the experience of different countries showing varied interest in krill fishing so that India could learn from their experiences. MEA, in collaboration with MoES, will examine and identify the countries with which India can collaborate for krill fishing. MoES will ascertain the interest of Indian industry in krill fishing and also explore the feasibility of Indian companies collaborating directly with foreign companies. MoES will study legislations enacted by other member countries before finalising the draft legislation as part of international convention obligations. MoES will bring out a paper on krill fishing giving a detailed account of demand analysis, financial viability, interest of industry, experiences of other countries, criteria for fishing license, existing knowledge gap, etc. Thereafter, the CoS will meet again to decide whether India should engage in commercial krill fishing.	The Ministry has examined the aspect of Krill fishing. Japan & Norway have developed expertise and these countries have been tentatively identified for collaboration on Krill fishing. Their experiences have been obtained. Indian Industries have been approached for Krill fishing to ascertain their interests. However, so far we have not received any response. The draft paper is prepared and suggestions of Cabinet Secretariat have been obtained.	There is no response from the private industries for a long time. Accordingly, it is proposed to close this item for monthly reporting. As and when the response is received, the same will be reported.

4. **Cases of sanction for prosecution pending in the Ministry for more than three months:** Nil

5. **Particulars of cases in which there has been a departure from the Transaction of Business rules of established policy of the Government:** Nil

6. **Status of implementation of e-Governance :** Under process/ being implemented

7. **Status of Public grievances:**

No. Of Public Grievances redressed during the month	No. Of Public Grievances pending at the end of the month
37	41

8. **Information on the specific steps taken by the Ministry/Department for utilization of the 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.

Annex-I

Important policy decision taken and major achievements:

Indian winter Arctic expedition (2016-17) aimed at monitoring mass balance and dynamics of selected glaciers as well as measure of Arctic precipitation and atmospheric aerosols was launched.

The Indian Expedition to Southern Ocean/Antarctic Waters (2016-17) was concluded. Continuous observations for various atmospheric and oceanic parameters were carried out in the entire cruise track. Mooring equipments at various depths were deployed for a period of one year in the Subtropical Frontal region [40.11°S 58.5°E]. Time series observations for a period of 72 hours were carried out at the Prydz Bay region [near the coastal waters of the India's third Antarctic station "Bharati"].

Offshore substructure to support LiDAR for measuring offshore wind has been successfully installed in Gulf of Khambhat which is the first of its kind in the country. The design and installation methodologies were evolved by National Institute of Ocean Technology (NIOT), an autonomous institute under the Ministry of Earth Sciences at Chennai.

The State-of-the-art Ocean State Forecast Laboratory was set up at the Indian National Centre for Ocean Information Services (INCOIS), an autonomous institute under the Ministry of Earth Sciences, Hyderabad. The state-of-the-art Ocean State Forecast Laboratory consists of a video wall with control unit for display along with a Decision Support System comprising of Forecast Assessment and Support Tool (FAST) for better decision making from a range of model outputs and observations.

Ministry of Earth Sciences (MoES), New Delhi has set up a dedicated Seabed Minerals Laboratory with state-of-art facilities at CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT), Bhubaneswar for metallurgical research on seabed minerals for Polymetallic Nodules.

Minimum Government, Maximum Governance:

Agromet Advisories are being communicated to 214 lakh farmers of the country through mobile SMS.

Adverse weather SMS warning are being sent through mobiles to State Govt. officials / Disaster related officials / Central Govt. Organization/Common men.

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	Target	Commissioned up to March, 2017	Data reporting
Automatic Weather Station (AWS)	675	682	367
Automatic Rain Gauge (ARG)	1350	1350	580
GPS Sonde	10	43	43
Doppler Weather Radar (DWR)	23	20	20
Ozone	17	15	5
Black Carbon Monitoring Systems (Aethalometer)	16	16	16
Other Rain Gauges excluding ARG and AWS @	-	-	2353
Aviation	--	73	73

@ Data received from various agencies viz. Air Force, Railways, Central Water Commission, State Agriculture, State Irrigation and India Meteorological Department (IMD)

Atmospheric Processes, Modeling and Services

Monthly Weather Summary (March, 2017)

Eight (8) Western Disturbance (W.D.) influenced Western Himalayan region and adjoining northern plains during the month. Out of eight, three caused fairly widespread to widespread rain/snow over Jammu & Kashmir and Himachal Pradesh with isolated heavy fall over Jammu & Kashmir on 10th March 2017 and scattered to fairly widespread over Uttarakhand; isolated to fairly widespread over adjoining plains of northwest India. Remaining five disturbances caused isolated to fairly widespread rainfall over Western Himalayan region.

Scattered to widespread rainfall activity observed over northeastern states on many days of the month with isolated extremely heavy fall over Assam & Meghalaya on 23rd March.

Thundersquall & Hailstorm activity during the month :

S. No.	Region	Thunderstorm days	Maximum TS Activity	Hail/squall
1.	South Peninsular India	20	14-15 March	Hailstorm was recorded over Tuini on 20 March.
2.	Northwest India	14	10 March	Hailstorms were recorded over Shimla on 1 March & 9 March, Batote on 8 March, Patiala & Tehri on 10 March.
3.	Northeast India	20	18 March	Agartala recorded Hailstorm on 18 March and Thundersquall on 25 March.
4.	East India	16	9 March	Thundersqualls were observed over Alipore on 10 & 11 March, Daltongunj on 10 March, Digha on 20 March, and Hailstorms were recorded over Jharsuguda on 17 March, Jalpaiguri on 18 March and Digha on 19 March.
5.	Central India	5	7 March & 16 March	Nil
6.	West India	Nil	---	--

Maximum temperatures were observed above normal to appreciably above normal over plains of northwest, central, east, northeast and peninsular India during the first half of the month. In second half of the month the maximum temperatures remained markedly above normal over northwest, west, east and central India resulting in heat wave to severe heat wave conditions at many places over west & central India and at isolated few places over east India. Warm night conditions were also observed at isolated places over Rajasthan and Madhya Pradesh on one or two days of the month mainly on second half of the month.

Rainfall in March, 2017

Rainfall during the month of March, 2017 was large excess in 8, excess in 5, normal in 6, deficient/ large deficient in 14 and no rain in 3 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month has been recorded as 28.4mm (-8%) against the normal rainfall for the month as 30.9 mm.

Heavy Rainfall Verification for the month: Total No. of Heavy Rainfall events: 39

Days→	Day 1	Day 2	Day 3
Percentage correct	0.91	0.90	0.90

Heat Wave Verification for the month :

Days→	Day 1	Day 2	Day 3
Percentage correct	0.97	0.97	0.96

Daily All India Weather Summary and Weekly Weather Reports are being brought out on routine basis.

Daily Normals of global and diffuse radiation (1971-2000) have been published. ENSO bulletin and Seasonal Climate Outlook for South Asia for the month of February 2017 and Hot Weather Season Outlook 2017 were issued.

Geoscience Research

Seismological Observational Network

Observation Type	Target for XII Plan	Commissioned so far	Data reporting during the month
Seismic stations	130	99	59
GPS stations	40	28	22

Earthquake and Tsunami monitoring

Earthquake: 26 earthquakes were monitored in the Indian region out of which 5 events were greater than magnitude (M) of 5.0.

Tsunami: There was no major seabed earthquake(M> 6) with a potential to generate tsunami.

Ocean Observation System

Type of Platform	Target	Commissioned till March, 2017	Data received during March, 2017
Argo Floats	200	294	138
Drifters*	150	103	8
Moored Buoys	16	19	18
Tide Gauges	36	33	25
High Frequency(HF) Radars	10	10	7
Current Meter Array	10	11	2
Acoustic Doppler Current Profiler(ADCP)	20	21	18
Tsunami Buoys	7	9	6
Wave Rider Buoy	16	15	15

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

Ocean Science Services

No	Types of forecasts	No. of advisories issued during the month
1	Integrated Potential Fishing Zone (PFZ) advisories (Sea Surface Temperature(SST), Chlorophyll., wind)	28
2	Tuna Fishing Advisories	22
2	Ocean State Forecast(OSF)-Wave, Wind, Currents, SST, MLD and D20 forecasts	28
3.	Near Real time global ocean analysis (5-day averaged)	6
4.	Real time global ocean analysis (daily)	28
5.	Coral Bleaching Alert System	10

Location specific forecast was issued for TDV Sagar Nidhi during March 2-13, 2017 and for ONGC (off Kakinada) from March 3, 2017 to till date.

Marine Living Resources: A continuous occurrence of bloom of phytoplankton dominated by *oscillatoria* species was reported from Agatti waters during March 2017. The bloom lasted for 2-3 days. Earlier, similar occurrence of bloom was reported during May 2014 and March 2016.

Capacity Building and Outreach

As part of the INDO-US Partnership for Climate Resilience, announced by Prime Minister of India, Shri Narendra Modi and the United States (U.S.) President ,Mr. Barack Obama in 2014, the Indian Institute of Tropical Meteorology (IITM), Pune organised the first in a series of workshops on “Development and Applications of Downscaling Climate Projections” at IITM, Pune during 07–09 March 2017. The workshop was focused on techniques for downscaling climate information and opportunities for sharing available downscaled information to local planners in India.

An International Training course was conducted on 'Discovery and Use of Operational Data Products and Services' during March 6-10, 2017, in collaboration with International Oceanographic Data and Information Exchange (IODE)-Inter-governmental Oceanographic Commission (IOC), and Ocean Teacher Global Academy(OTGA). Eighteen (18) participants, of which 7 from 5 foreign countries and 11 from India attended the course. The course was fully funded by IODE.

A two day "National Workshop on Heat Wave Forecasts for State Level Preparedness in India" during,28-29 March 2017 was organized by India Meteorological Department and India Meteorological Society in New Delhi.

A brainstorming session on "Roadmap to Ocean Energy" was held on 27th March 2017 at National Institute of Ocean Technology(NIOT) to discuss plans for scaling up ocean energy development in India.

A Workshop on Ensemble Weather Prediction System and its use in developing new applications for users (ENSEMBLE-2017) was organized jointly by Snow and Avalanche Study Establishment(SASE) and National Centre for Medium Range Weather Forecasting (NCMRWF) at SASE, DRDO, Chandigarh during 17-18 March. More than 40 officers attended this workshop.

One day Hindi workshop was organized on 15 March 2017 at the IITM on 'Use of Technology in the Progress of Official Language'. Around 30 employees participated in the workshop.

World Meteorological Day on the theme of "Understanding Clouds" was celebrated on 23rd March 2017 by India Meteorological Department (IMD), and Indian Institute of Tropical Meteorology (IITM) all over India. On this occasion, exhibitions, special lectures, talks, interviews etc were arranged.

National Science Day 2017 was celebrated. Students from various schools and colleges, and public in general visited the institutes of the Ministry on this occasion. Visitors were taken on guided tour to different laboratories and facilities at the institute. IITM scientists and researchers demonstrated and explained different aspects of weather and climate sciences to these visitors. IITM participated in science exhibition as a part of the National Science Day Celebrations at Giant Metrewave Radio Telescope (GMRT), Khodad, Narayangaon during 28 February - 01 March 2017 with a view to popularize Atmospheric Sciences.

Utilization of Ocean Research Vessels during the month

Vessel	Days at Sea / Utilization	Maintenance/ Inspection /Scientific Logistics / Cruise Preparation	No. of Cruise	No. of Port Calls / Port Stay/ Statutory survey
Sagar Nidhi	29	2	2	2
Sagar Manjusha	27	4	3	-
Sagar Purvi	-	31(Dry dock)	-	-
Sagar Kanya	20	11	2	-
Sagar Sampada	21	7	2	-

Publications in Science Citation Index(SCI) journals and PhDs awarded

Subject	Publications			Ph.Ds		
	April 2016- February, 2017	March, 2017	Total	April 2016 - January,2016	March, 2017	Total
Atmospheric Sciences	168	9	177	5	1	6
Ocean Science and Technology	51	3	54	2	-	2
Polar Sciences	30	2	32	-	-	-
Geosciences and resources	8	-	8	-	-	-
Total	257	14	271	7	1	8