Ministry of Earth Sciences (MoES)
Summary of Important Developments –January, 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 MoESwill 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
29	38

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 Scientific Expedition to Southern Ocean/Antarctic Waters (2016-2017) was launched for conducting process studies in the polar ocean ecosystem and understand its influence on regional and global climatic variabilities.

36th Scientific Expedition reached Antarctica and have started scientific activities in and around Indian Stations, Maitree and Bharati.

The field campaign to Antarctica under the Indo-Norwegian project MADICE (Mass balance, dynamics, and climate of the Dronning Maud Land coast, East Antarctica) was completed. Two types of ice-penetrating radar were deployed to map bed topography and ice stratigraphy. A total of 173 m ice cores were drilled, with the drilling at Djupranen ice rise provided the longest (122 m) ice core ever recovered by Indian team.

Dense/very dense fog observed at many/ few places over Indo-Gangetic Plains on many days and at few/isolated places over Northeastern States on a few days with 90% and 89% and 89% correct of fog warnings for 24 hour, 48 hour and 72 hour respectively during January 2017 .

A deep sea ankler fish, *Lophius gracilimanus* (one single Female specimen, 270mm Standard Length) has been rediscovered and redescribed after a gap of almost a century from off Andaman Coast of India, 7°5' N, 93° 4' E at a depth of 650 m. Further, a species of worm eel of genus *Neenchelys* has been discovered as new from South eastern Arabian sea off Kollam from 450 m depth during the exploratory survey. Presently there are only 2 species viz *Neenchelys buitendijki* Weber & de Beaufort 1916 and *N. cheni* (chen&Weng 1964) among 12 species in this genus, reported from Indian waters.

Minimum Government, Maximum Governance:

Agromet Advisories are being communicated to 194 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 January, 2017	Data reporting
Automatic Weather Station (AWS)	675	682	352
Automatic Rain Gauge(ARG)	1350	1341	513
GPS Sonde	10	43	43
Doppler Weather Radar(DWR)	23	20	19
Ozone	17	15	5
Black Carbon Monitoring Systems (Aethalometer)	16	16	16
Other Rain Gauges excluding ARG and AWS @	-	-	2435
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 (January, 2017)

Western Disturbances over Northern India: Five (5) Western Disturbances affected Western Himalayan region during the month. Out of five, one has caused fairly widespread to wide spread rainfall/snowfall with heavy rainfall/snowfall at a few places over Jammu & Kashmir and Himachal Pradesh during 24-26 January and light to moderate rainfall/snowfall over Uttarakhand; scattered to fairly wide spread rainfall over plains of northwest India on 25 and 26 January. Bulletins for this active Western Disturbance & its associated weather were issued from 19th January onwards indicating the possibility of wet spell over northwest India with likely heavy to very heavy snowfall over Jammu & Kashmir and Himachal Pradesh from 24th to 26th and heavy rainfall along with thunder squall/hail over isolated pockets over Punjab & Haryana on 25th & 26th. Bulletins were issued four times daily and a special press release was issued on 22nd January 2017 regarding possible adverse weather over northwest India.

Cold wave/Cold day**:** Cold wave/cold day conditions prevailed at a few places over plains of northwest India on few days and at isolated places over central and east India on one or two days. The Lowest Minimum Temperature (-2.0°C) recorded at Sikar (Rajasthan) on 14th January 2017.

Fog, Cold Wave/ Cold Day were predicted 2-3 days in advance through regular bulletins and also through press releases.

Rainfall in January, 2017

Rainfall during the month of January, 2017 was large excess in 8, excess in 4, normal in 2, deficient/large deficient in 16 and no rain in 6 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month has been recorded as 26.8 mm (+40%) against the normal rainfall for the month as 19.2 mm.

Experimental Climate Forecasting System (CFS) for seasonal forecasting developed under Monsoon Mission Project, is implemented for operational use from winter 2016-17.

Atmospheric Research

Based on the operational 33km/44-member Global Ensemble Prediction System(NGEPS) of National Centre for Medium Range Weather Forecasting(NCMRWF), provides probabilistic forecasts of daily Maximum (*Tmax*) for three thresholds of temperature less than 25, 20 and 15 degree Celsius and Minimum (*Tmin*) Temperatures less than 15, 10 and 5 degree Celsius during winter months of December to February. A higher resolution (17 km) version of NCMRWF Global Ensemble Prediction System (NGEPS) was developed and successfully tested with 22 members.

NCUM based city-scale model set up at 330 m resolution for Delhi for fog forecasting applications has been made operational by NCMRWF.

A high resolution (4 km) regional assimilation system has been set up for the Indian region and radial wind observations from various Indian Doppler Radars are assimilated experimentally.

The Hydrometeorology Research Unit (HMRU) at the Centre for Climate Change Research (CCCR), IITM was recently formed for the coordinated development and implementation of observational and modeling challenges involving climate scientists and hydrologists. COSMOS-India network is a collaborative observational program and is a segment of Natural Environment Research Council (NERC) and UK and Ministry of Earth Sciences (MoES), Government of India i.e. “NERC-MoES”. This is for developing and promoting the observational national network for continuous monitoring of water balance components like soil moisture, evapotranspiration, runoff etc. A network of field-scale soil moisture monitoring stations across India (COSMOS-India) is being developed using cosmic-ray soil moisture sensors (CRS). The Centre for Ecology and Hydrology, UK (CEH) is working in partnership with Indian Institute of Science (IISc), Bangalore, Indian Institutes of Technology (IIT), Kanpur, IITM Pune, University of Agricultural Sciences (UAS), Dharwad and National Institute Of Hydrology (NIH), Roorkee to develop the COSMOS-India network, and to deliver high temporal frequency observations of soil moisture at the intermediate spatial scale in near real-time. Data from this national observational network are being telemetered over the mobile communications network to be made available in near-real time.

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: 20 earthquakes were monitored in the Indian region out of which 4 events were greater than magnitude (M) of 5.0.

Tsunami**:** 5 major seabed earthquakes(M> 6) with a potential to generate tsunami were monitored. This information was provided within 12 minutes of occurrence in respect of 3 events, between 12 to 15 minutes of occurrence in respect of one event and between 18 to 20 minutes of occurrence in respect of remaining event.

Ocean Observation System

Type of Platform	Target	Commissioned till January, 2017	Data received during January, 2017
Argo Floats^	200	288	137
Drifters*	150	103	10
Moored Buoys	16	19	15
Tide Gauges	36	31	22
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)	31
2	Tuna Fishing Advisories	27
2	Ocean State Forecast(OSF)-Wave, Wind, Currents, SST, MLD and D20 forecasts	31
3.	Near Real time global ocean analysis (5-day averaged)	6
4.	Real time global ocean analysis (daily)	30
5.	Coral Bleaching Alert System	11

INCOIS took up a consultancy project costing Rs: 23.5 lakh to provide Data on Wind, Wave and Currents for ONGC's Central Process Platform at ONGC KG DWN 98/2 site off Kakinada for ONGC.

Ocean Technology

A shallow water Remotely operated Vehicle developed by National Institute of Ocean Technology(NIOT), an autonomous Institute under Ministry of Earth Science , was deployed. Sonar and underwater visuals were collected for sunken barge and report submitted to Chennai Port.

Swath Bathymetric Survey of Exclusive Economic Zone

An area of about 23,000 sq km swath was surveyed with acquisition of bathymetric data.

Capacity Building and Outreach

MoES participated at Indian Science Congress(ISC) held in Thirupathi during 3-7 January 2017 as well as the Pride of India Expo at ISC.

IITM in association with Vijnana Bharati organized “Environmental Awareness Event” to create awareness about impact of air pollution and climate change on various environmental aspects on 16 January 2017 at IITM, Pune. The theme of the event was "National Forest Conservation Day", On this occasion Public Lecture on “Forest Conservation and Sustainable Development” by eminent scientist Dr. Rahul Mungikar, Senior Research Consultant, Maharashtra State Biodiversity Board, Pune, was arranged. Shri Jayant Sahasrabuddhe, National Organising Secretary, Vijnana Bharati, was invited as a chief guest. Various competitions such as Drawing, Best out of waste, Essay writing and Elocution competitions for the school students for standard 5th to 11th were arranged. Around 160 students from 21 schools participated in this event.

Memorandum of Understanding (MoU) between IITM and Savitribai Phule Shikshan Prasarak Mandal’s N. B. Navale Sinhgad College of Engineering (SPSPM’s NBNSCOE), Solapur, Maharashtra, India on Technical Cooperation and establishment of an observational facility for C-band radar and other ground based instrumentation was signed on 12th January 2017 for the Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX) Phase IV during 2017-2020.

IITM participated in Science Exhibition at 24th National Children Science Congress held at Baramati during 27-31 December 2016.

IMD celebrated its 142nd Foundation Day on 15th January 2017.

The Annual Cyclone Review and Annual Monsoon Review (ACR and AMR) Meetings were held at Nagpur during 19-20 January 2017 at Nagpur. Scientists from IMD, Ministry of Earth Sciences (MoES), Indian Institute of Tropical Meteorology (IITM) Pune, National Centre for Medium Range Weather Forecasting (NCMRWF), Indian National Centre for Ocean Information Services (INCOIS) and National Institute of Ocean Technology (NIOT) participated in the meeting for planning operational services strategy improvements for 2017-18.

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	22	8	2	1
Sagar Manjusha	21	10	1	-
Sagar Purvi	-	31(Dry dock preparation)	-	-
Sagar Kanya	16	15	1	-
Sagar Sampada	27	4	1	-

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

Subject	Publications			Ph.Ds		
	April-December,2017	January, 2017	Total	April-December,2016	January, 2017	Total
Atmospheric Sciences	135	17	152	3	1	4
Ocean Science and Technology	43	4	47	1	1	2
Polar Sciences	26	2	28	-	-	-
Geosciences and resources	8	-	8	-	-	-
Total	212	23	235	4	2	6