Ministry of Earth Sciences (MoES)
Summary of Important Developments –February, 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
38	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:

A new cutting-edge Cosmic-ray Soil Moisture Observation System (COSMOS) was launched. A network of field-scale soil moisture monitoring stations is being developed across India (COSMOS-India) under the NERC-MoES program using cosmic-ray soil moisture sensors (CRS). The IITM CRS is the latest addition to the COSMOS-India network. Other COSMOS-India network sites are located in southern Karnataka (3 sites), Dharwad (1 site) and Kanpur (1 site). Additional sites will be added to the network over the coming months.

A Ship-building contract for design/delivery of 2 Coastal Research Vessel has been signed on 17 Feb 17 with M/S Titagarh, Kolkata.

The ongoing (experimental) real time Short Range Deterministic Forecasting system based on GFS T1534 has been established in IITM and 8 days forecast based on daily 0000 UTC initial condition provided by National Centre for Medium Range Weather Forecasting (NCMRWF) has been disseminated to IMD by 15:00hrs. High resolution Global Forecast System (GFS) model at T1534 (Global horizontal resolution~12 km) has been run on real time daily (experimental basis) to generate deterministic forecast for 8 days and is made available at http://srf.tropmet.res.in/srf/files/archive_hires.php . The T1534 GFS forecast is found to capture the location and intensity of extreme rains and also the cyclogenesis with reasonably advance lead time.

Temperature Forecast Outlook for 2017 Hot Weather Season (March – May) suggests that above normal temperatures upto 1.0 ºC are likely to prevail over all meteorological subdivisions of the country except Northwest India where temperatures are likely to be more than 1.0 ºC above normal.

Minimum Government, Maximum Governance:

Agromet Advisories are being communicated to 243 lakh farmers of the country through mobile SMS.

A Mobile App has been developed by IMD & Kerala IT Mission jointly for dissemination weather services viz., daily weather forecast warnings and district wise Agromet. advisories for public and farmers of Kerala.

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 February, 2017	Data reporting
Automatic Weather Station (AWS)	675	682	364
Automatic Rain Gauge(ARG)	1350	1350	563
GPS Sonde	10	43	43
Doppler Weather Radar(DWR)	23	20	18
Ozone	17	15	5
Black Carbon Monitoring Systems (Aethalometer)	16	16	16
Other Rain Gauges excluding ARG and AWS @	-	-	2373
Aviation	--	73	73

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

12 Indian Navy ships were recruited in Indian Voluntary Observing Fleet.

Atmospheric Processes, Modeling and Services

Monthly Weather Summary (February, 2017)

i. Seven (7) western disturbances approached western Himalayan region during the month. Out of seven, three caused fairly widespread to widespread rainfall/snowfall over Jammu & Kashmir & Himachal Pradesh and light to moderate rainfall over Uttarakhand; scattered to fairly wide spread rainfall over plains of northwest India on 5th and 6th February. Isolated heavy falls also observed over Jammu & Kashmir on 5th and 6th February Rest four western disturbances caused isolated to fairly widespread rainfall over western Himalayan region during the month.

ii. Isolated to scattered rainfall activity occurred over east & adjoining central India on one or two days, and over northeast India on few days with isolated heavy falls on one or two days during February,

iii. Dense/ very dense fog observed at a few places over northern plains and northeast India during some days during first half of February.

iv. Maximum/minimum temperatures were observed above normal by about 4-6 °C over most parts of northwest, west & adjoining central India during 16-22 February and become near normal thereafter. The temperatures again rose mainly over western parts of the country leading to heat wave conditions over Konkan on 25 & 26 and over Saurashtra coast on 26 February due to advection of dry air from Saudi Arabia.

v. Thundersquall & Hailstorm activity during the month :

S. No.	Region	Thunderstorm days	Maximum TS Activity	Hail/squall
1.	South Peninsular India	0	-	Thundersquall: Nil Hailstorm: Nil
2.	Northwest India	06	5th February	Thundersquall: Nil Hailstorm:04-Shimla(1), Sundernagar(2),Tehri(1)
3.	Northeast India	03	22nd February	Thundersquall: Nil Hailstorm: 01-Cherrapunjee
4.	East India	0	-	Thundersquall: Nil Hailstorm: Nil
5.	West India	0	-	Thundersquall: Nil Hailstorm: Nil
6.	Central India	02	11th February	Thundersquall: Nil Hailstorm: Nil

Rainfall in February, 2017

Rainfall during the month of February, 2017 was large excess in 1, excess in 1, normal in 2, deficient/large deficient in 20 and no rain in 13 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month has been recorded as 12.4 mm (-41%) against the normal rainfall for the month as 22.2 mm.

Atmospheric Research

National Centre for Medium Range Weather Forecasting(NCMRWF) under Ministry of Earth Sciences has started generating snow forecasts from NCUM global model for Himalayan region. These have been shared with Snow Avalanche Study Establishment (SASE) in real-time basis from 1st Feb 2017. SASE will evaluate the forecasts of snow and provide feedback for this season to help NCMRWF make this product operational. It is planned that from next winter season (2017-18) ensemble snow products will also be shared with SASE.

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: 22 earthquakes were monitored in the Indian region out of which 5 events were greater than magnitude (M) of 5.0.
A significant earthquake of magnitude 5.8 at Latitude 30.6° N & Longitude 70.1° E occurred on 06-02-2017 at 22:33:08 hrs IST with epicenter in the Rudraprayag (Uttarakhand) district. The epicentral parameters were disseminated through SMS, FAX & E-mail and also posted on IMD website. The event was widely felt in the states of Uttarakhand, Uttar Pradesh, NCR Delhi, Haryana, Punjab, Himachal Pradesh and Jammu & Kashmir.

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 4 events, and between 12 to 15 minutes of occurrence in respect of one event.

Ocean Observation System

Type of Platform	Target	Commissioned till February, 2017	Data received during February, 2017
Argo Floats^	200	288	137
Drifters*	150	103	10
Moored Buoys	16	19	14
Tide Gauges	36	33	33
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	28
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	9

Upon occurrence of oil spill off Ennore port, due to the collision of vessels MAPLE & DAWN on 28.01.2017 at 04.00 hrs, trajectory predictions indicating the movement of oil spill off the Ennore (Chennai) were disseminated as Bulletins to Indian Coast Guard. Four Bulletins were issued from 28.01.2017 to 08.02.2017.

Marine Living Resources

A new species of deep sea angler fish belonging to the genus *Chaunax,* 196mm has been collected from the southwest coast of India, 8.28° N, 76.20°E at a depth of 1050-1100 m. New species belong to *C. fimbriatus*-species group which is characterized by having filaments on the dorsal head, lack of flap-like cirri laterally on the body associated with the lateral line; flat, broad oval shaped illicial trough with cirri present along the margin of the illicial trough; relatively long tail (35.2% SL); 3-4 neuromasts in upper preopercular series, 14-15 in pectoral series; 11 rakers on second and third gill arches.

Capacity Building and Outreach

Dr. S.S.C. Shenoi, Director, Indian National Centre for Ocean Information Services, an autonomous Institute under the MoES was appointed as the Chair of Executive Council of Union Commission on Data and Information (UCDI) for a period of 3 years.

An International Workshop on Representation of Physical Processes in Weather and Climate Models (INTROSPECT 2017) was organized at IITM during 13-16 February 2017. The workshop emphasized the debate

of cloud resolving approach or hybrid approach (with parameterized convection and grid scale cloud microphysics) and its impact on model fidelity. The workshop addressed the major challenge areas to numerical prediction models viz., a) need of scale aware parameterizations schemes, b) stochastic and multiscale nature of schemes and c) unified scheme of physical processes. The workshop provided a platform to bring together world renowned experts from all over the globe to meet, discuss and do hands on and deliver lectures to Indian participants/students. About 20 Experts from UK, USA, Korea, Canada, Japan, Netherlands and 73 participants across the country participated in the International Workshop. The webcasting of the talks was arranged and benefited the students/faculties who could not attend the workshop. As an outcome of the workshop, it is recommended by the experts, to constitute a consortium where all the researchers working in the field of parameterization can discuss issues related to parameterization in the country.

National Centre for Antarctic and Ocean Research(NCAOR) participated in Science Fiesta organised by Goa Science Centre and Planetarium, Panaji from 25th-28th February, 2017. NCAOR has set up a stall to show its major activities viz. Polar activities, Antarctic rock samples, Himalayan studies, oceanic studies etc. Two popular science lectures were also delivered by NCAOR scientists.

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	17	11	4	-
Sagar Purvi	-	28(Dry dock)	-	-
Sagar Kanya	28	0	1	-
Sagar Sampada	21	7	2	-

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

Subject	Publications			Ph.Ds		
	April-January,2017	February, 2017	Total	April-January,2016	February, 2017	Total
Atmospheric Sciences	152	16	168	4	1	5
Ocean Science and Technology	47	4	51	2	-	2
Polar Sciences	28	2	30	-	-	-
Geosciences and resources	8	-	8	-	-	-
Total	235	22	257	6	1	7