

**Ministry of Earth Sciences (MoES)**  
**Summary of Important Developments –January, 2019**

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.	<p>Dt 14/08/2014            PROPOSAL FOR KRILL FISHING</p> <p>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.</p> <p>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.</p>	<p>The Ministry has examined the aspect of Krill fishing. Japan &amp; 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.</p>	<p>A proposal has been received for krill fishing which is under examination.</p>

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

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

• **Status of implementation of e-Governance :** Being implemented

• **Status of Public grievances:**

No. of Public Grievances redressed during the month	No. of Public Grievances pending at the end of the month
14	33

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

9. (i) **Confirmation that the incumbency details of all posts in the Ministry/Department and its organizations falling under the purview of the ACC have been updated on AVMS:** 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.

(ii) **Status regarding compliance of the directions of ACC:** It is also confirmed that the directions of ACC are complied with.

(iii) **Status of cases where recommendations from PESB have been received but the proposals are yet to be submitted to the ACC Secretariat:** NIL

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**Annex-I**

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

Dr. Harsh Vardhan, Hon'ble Minister of Science and Technology, Earth Sciences, Environment and Climate Change dedicated the restored beach at Puducherry and Kadalur fishing villages along the Tamil Nadu/Puducherry coast to the Nation on 24<sup>th</sup> January 2019. The beaches were restored through technology interventions by National Institute of Ocean Technology(NIOT), an autonomous institute under Ministry of Earth Sciences. Dr. Kiran Bedi, IPS, (Retd.) Hon'ble Lt. Governor of Puducherry and Shri V. Narayanaswamy, Hon'ble Chief Minister were present at Puducherry to witness this event.

A mobile application named "Kumbh Mela Weather Service" has been developed by Indian Institute of Tropical Meteorology(IITM) to disseminate live weather information (temperature, humidity, rainfall and winds) as observed. The App also provides weather forecast and warnings, if any, for Prayagraj for next 3 days. The App was launched by Dr. Harsh Vardhan, the Honourable Union Minister of Science and Technology, Earth Sciences and Environment and Forests and Climate Change on 14 January 2019 at New Delhi.

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 mode. Presently, 40 million farmers in the country are getting advisories through SMS 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	Data Reporting
Automatic Weather Station (AWS)	682	293
Automatic Rain Gauge (ARG)	1350	515

GPS Sonde based RS/RW Stations	43	39
Doppler Weather Radar (DWR)	25	22
Ozone (Ozone Sonde + Total Ozone)	05	05
Surface Ozone over Delhi (Electrochemical Concentration Cell)	07	07
Nephelometer	12	12
Sky Radiometer	20	19
Black Carbon Monitoring Systems (Aethalometer)	16	15
Air Quality Monitoring System (SAFAR-Delhi)	10	10
Hydromet. (IMD & Extra-departmental excluding AWS & ARG)	---	2492@
Aviation	79	79

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

#### **Atmospheric Processes, Modelling and Services**

**Significant Weather System (Cyclonic Storm ‘Pabuk’ over Andaman Sea during 04-08 January, 2019):** Cyclonic Storm (CS) Pabuk originated from a low pressure area (LPA) which formed over south China Sea on 28<sup>th</sup> December. At 0600 UTC of 1<sup>st</sup> January, it intensified into a tropical storm “Pabuk” over Gulf of Thailand and moved west-northwestwards, it emerged into the north Indian Ocean region over Andaman Sea in the morning (0300 UTC) of 5<sup>th</sup> January; moved further west-northwestwards and gradually weakened into a Deep Depression(DD) around noon (0600 UTC) and crossed Andaman Islands near 11.6°N/92.7°E, close to south of Port Blair during night (between 1300 and 1500 UTC) of 6<sup>th</sup> January with maximum sustained wind speed of 55-65 kmph gusting to 75 kmph; this further weakened into a Depression(D) in the early morning (0000 UTC) of 7<sup>th</sup> and into a well marked low pressure area in the early morning (0000 UTC) of 8<sup>th</sup> January over eastcentral Bay of Bengal(BoB) and adjoining areas. Under the influence of the system, on 7<sup>th</sup> January, moderate rainfall occurred over Andaman and Nicobar Islands at many places and heavy rainfall occurred over Andaman Islands at a few places. Port Blair reported maximum wind speed of 55-65 kmph gusting to 75 kmph between 1300 and 1500 UTC of 6<sup>th</sup> January. IMD provided three hourly advisories during cyclonic storm stage and six hourly advisories during Deep Depression/Depression stage to the concerned disaster management agencies at central, state and district levels, press and electronic media and other stakeholders like fishermen, fishery officials, ports, ships, Railways, surface transport, civil aviation, IAF, India Navy, coast guard etc. As a whole 27 bulletins were issued by IMD at national level. India Meteorological Department (IMD) acts as World Meteorological Organisation’s (WMO’s) designated Regional Specialised Meteorological Centres (RSMC)-Tropical Cyclones to provide Tropical Cyclone Advisories to WMO/ESCAP Panel Member countries including Bangladesh and Myanmar. The genesis, track and intensification/weakening of this system was well predicted by IMD at least 3 days in advance.

**Rainfall in January, 2019:** Rainfall during the month of January, 2019 was large excess in 5, excess in 4, normal in 7, deficient in 2, large deficient in 12 and no rain in 6 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month of January, 2019 has been recorded as 18.5 mm which is -4% of its Long Period Average (LPA) of 19.2 mm.

**Heavy Rainfall Activity:** Heavy rainfall observed at isolated places over Tamilnadu, Telangana, Rayalaseema and Andaman & Nicobar Islands on one or two days of the month. Heavy to very heavy rainfall/snowfall observed at isolated places over Jammu & Kashmir and heavy over Himachal Pradesh and Uttarakhand on one or two days of the month of January.

No. of heavy rainfall events and (% correct) of spatial distribution of warnings during January 2019 is given below:

Lead Time	No. of Heavy Rainfall (Events): 15
	Heavy Rainfall (>64.4mm)
24 Hour	98%
48 Hour	98%
72 Hour	98%

**Western Disturbances (WDs) and associated weather:** Eight (08) Western Disturbances (WD) had affected western Himalayan region during the period 1-4, 3-17, 7-11, 10-14, 15-18, 16-18, 18-28 and 29-31 January 2019. Out of these 8 WDs, one active western disturbance along with its induced cyclonic circulation during 18-28 January, has caused widespread rain / snow over Western Himalayan Region and adjoining plains of northwest India during 21–23 January. Heavy/ very heavy rain / snow at isolated places were also reported over the region during this period. Rest seven western disturbances caused isolated to scattered precipitation over Western Himalayan Region and isolated rainfall over adjoining plains during the month of January. The forecasts of these WDs and associated weather were issued 3-4 days in advance.

Thundersquall(TS) & Hailstorm activity during the month (till 0830 IST of 31-01-2019) is given in the table below:

S.No.	Region	TS Days	Maximum TS Activity	Hail	Squall
1.	South Peninsular India	0	--	Nil	Nil
2.	Northwest India	10	21 <sup>st</sup> & 22 <sup>nd</sup> January	Tehri(07 <sup>th</sup> January), Mount Abu (21 <sup>st</sup> January), Agra (22 <sup>nd</sup> January), Mukteshwar & Lucknow (25 <sup>th</sup> January), Delhi (24 <sup>th</sup> January)	Nil
3.	Northeast India	4	29 <sup>th</sup> January	Nil	Nil
4.	East India	4	--	Nil	Nil
5.	Central India	3	24 <sup>th</sup> January	24-01-19: (Siwani, Chhindwada, Rewa, Satna, Balaghat, Mandla, abalpur) 25-01-19: (Rewa, Satna, Singrauli, Anuppur)	Nil
6.	West India	0	--	Nil	Nil

**Note:** The convective activities mentioned above had been predicted and corresponding warnings were issued about 4-5 days in advance of the occurrence of the event.

**Temperature Scenario:** Cold wave to severe cold wave conditions prevailed in some parts of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Chandigarh & Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Jharkhand, Bihar, Saurashtra & Kutch, Odisha, Vidarbha and Telangana on a few days and at isolated pockets over Madhya Maharashtra, Marathwada, West Bengal, coastal Andhra Pradesh and north interior Karnataka on one or two days of the month. The lowest minimum temperature of **-1.1<sup>o</sup> C** was recorded at Churu (West Rajasthan) on 29<sup>th</sup> January 2019 over the plains of the country during the month of January.

**Fog:** Dense to very dense fog observed at a few places over Punjab, Haryana, Chandigarh & Delhi, north Rajasthan and West Uttar Pradesh on many days; over lower reaches of Jammu & Kashmir, Himachal Pradesh and Uttarakhand and over East Uttar Pradesh, Assam & Meghalaya and Nagaland, Manipur, Mizoram & Tripura on a few days; over

Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, West Bengal, Odisha, Vidarbha, Telangana, Coastal Andhra Pradesh, South Interior Karnataka and Saurashtra & Kutch on one or two days of the month of January.

### Annual performance of cyclone track forecast, landfall forecast and intensity forecast

**The annual average track forecast errors** in 2018 have been 88 km, 124 km and 134 km, respectively for 24, 48 and 72 hrs against the past five year average error of 93, 144 and 201 km based on data of 2013-2017. The track forecast skills compared to climatology and persistence forecast are 54%, 69% and 78% respectively for the 24, 48 and 72 hrs lead period compared to long period average of 2013-2017 (55%, 68% & 72% respectively).

**The annual average landfall point forecast errors** for the year 2018 have been 44 km, 40 km and 68 km for 24, 48 and 72 hrs lead period against the long period average of 42 km, 95 km and 122 km during 2013-2017. The landfall time forecast errors have been 2.8, 5.0 and 7.4 hrs for 24, 48 and 72 hrs lead period during 2018 against the average of past five years of 3.6, 5.4 and 3.8 hrs during 2013-2017. The annual landfall time errors during 2018 were also less than the long period average upto 48 hrs lead period.

**The average absolute errors in intensity forecast** during 2018 have been 8.2 knots, 11.6 knots and 12.9 knots respectively for 24, 48 and 72 hrs lead period of forecast against the past five year average of 10.4, 15.5 and 15.7 knots. The root mean square errors have been 9.8 knots, 14.4 knots and 15.1 knots respectively for 24, 48 and 72 hrs lead period of forecast against the past five year average of 14.1, 20.6 and 20.6 knots.

### Bulletins / Operational Reports/ Services

All India Weather Bulletins, all India inference and severe weather warnings were issued 124 each; 17 number of Press Releases issued (9 for low pressure system over Bay of Bengal, 7 for wet spells over northwest India and 1 for India Meteorological Department Foundation day celebration). Current weather outlook and forecast for next two weeks (5); All India Weekly Weather Reports (5) each were also issued during the month.

Sixty-two (62) mountain weather bulletins including severe weather warnings for western and central Himalayan region were issued during the month.

A total of 31 Nowcast Guidance Bulletins for severe weather were issued (daily once) during the month..

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

ENSO bulletin for January 2019 and Seasonal Climate Outlook for South Asia for the months of January to April 2019 were issued. ([www.imdpune.gov.in/Clim\\_Pred\\_LRF\\_New/Products.html](http://www.imdpune.gov.in/Clim_Pred_LRF_New/Products.html)).

### Geoscience Research

#### Seismological Observational Network

Observation Type	Target	Commissioned so far	Data reporting during the month
Seismic stations	115	115	107
GPS stations	40	24#	20

# Six VSATS (6) have been dismantled to shift them to new locations.

### Earthquake and Tsunami monitoring

**Earthquake:** 19 earthquakes were monitored in the Indian region out of which one event was greater than magnitude (M) of 5.0.

**Tsunami:** 3 seabed earthquakes (M> 6) with a potential to generate tsunami occurred. This information was provided within 12 minutes of occurrence in respect of 1 event and between 12-15 minutes in respect of the remaining event.

### Ocean Observation System

Type of Platform	Target	Commissioned till January, 2019	Data received during January, 2019
Argo Floats *	200	328	138
Drifters*	150	108	2
Moored Buoys	16	22	18

Tide Gauges	36	35	26
High Frequency(HF) Radars	10	10	10
Current Meter Array	10	11	2
Acoustic Doppler Current Profiler(ADCP)	20	20	17
Tsunami Buoys	7	9	4
Wave Rider Buoy	16	19	10

\*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	30
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)	31
5.	Coral Bleaching Alert System	10

High period swell and rough sea Alert issued to the South Tamil Nadu and entire west coastal states during 12-14 Jan 2019 due to the swell propagation from southern ocean.

### **Topographic survey of Exclusive Economic Zone(EEZ)**

Area surveyed during the month: 12,400 sq. km.

### **Ocean Technology**

CORNEA (Centre for Ocean Real time iNformation, viEw and Archival) , the Modernized Data Reception Centre was commissioned at NIOT on 24<sup>th</sup> January 2019.

### **Capacity Building and Outreach**

Two months training program for exploration of polymetallic sulfides organised from 3<sup>rd</sup> December 2018 – 26<sup>th</sup> January 2019 as a part of contractual commitment towards International Seabed Authority(ISA) was successfully completed. Different training modules were organised at National Centre for Polar and Ocean Research(Goa), Centre for Marine living Resources and Ecology(Kochi), Indian National Centre for Ocean Information Services(Hyderabad), National Centre for Earth Science Studies(Trivendrum) and National Institute of Ocean Technology(Chennai) for the 5 participants selected by ISA from developing nations who received the participation certificates.

A two day national conference on "Integrating Biogeochemistry and Ecosystems in a Changing Oceanic Environment" was organised on January 17-18, 2019 in Hyderabad. More than 130 participants from various institutions across the country participated and presented the papers. The conference had 13 invited talks by experts, 8 oral presentations by researchers and 26 poster presentations by students and early career scientists. The invited talks covered various aspects of biogeochemistry, ocean modeling and fisheries.

The third conference on India Radar Meteorology (iRAD2019), an initiative of the Ministry of Earth Sciences (MoES), Govt. of India was held at Indian Institute of Tropical Meteorology (IITM), Pune during 9-12 January 2019. The conference was jointly organized by IITM and IMD to promote radar meteorology in India and to provide a platform for an interaction between academia, research institutes and industry. One-day short-term course on "Weather radars for Microphysics of clouds and precipitation" was also organised to train young researchers and students in the field of Radar Meteorology.

The Second workshop on Indian Coastal Ocean Radar Network (ICORN) was organised on 24<sup>th</sup> June 2019 at NIOT, Chennai. On this occasion, the Proceedings of the workshop as well as Quality Manual for HF Radar were released.

The Sixth National Competition on Student Autonomous underwater Vehicle (SAVe 2019) was conducted at the Swimming Pool of IIT Madras during February 23-24, 2019. IIT Bombay & NIT Rourkela emerged as the winners of the competition

A half-day workshop on "Eco-Weather Watch" was organised in collaboration with Indian Meteorological Society(IMS) Hyderabad Chapter and Earth Watch Institute, Gurgaon on 30.1.2019 at Hyderabad.

Training Programme on Interpretation of Satellite Imageries and Products was conducted at Kolkata office on 21.01.2019.

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

Vessel	Days at Sea / Utilization	Maintenance/ Inspection /Scientific Logistics / Cruise Preparation	No. of Cruise
Sagar Nidhi	28	3(maintenance)	2
Sagar Manjusha	22	9( maintenance )	2
Sagar Purvi	19	12( maintenance, bad weather)	2
Sagar Kanya	21	10	2
Sagar Sampada	25	6	1

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

Subject	Publications			Ph.Ds		
	April - December, 2018	January, 2019	Total	April - December, 2018	January, 2019	Total
Atmospheric Sciences	136	31	167	4	2	6
Ocean Science and Technology	46	9	55	2	-	2
Polar Sciences	19	1	20	-	-	-
Geosciences and resources	6	1	7	-	-	-
Total	207	42	249	6	2	8

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

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Dated, the 1<sup>st</sup> February, 2019

CERTIFICATE

(FOR THE MONTH OF JANUARY, 2019)

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 January, 2019. A summary of the status is given below:-

- |     |                                                                 |      |
|-----|-----------------------------------------------------------------|------|
| (a) | The total number of posts required to be entered on AVMS        | - 06 |
| (b) | Number of posts filled as on date                               | - 06 |
| (c) | Number of posts totally vacant as on date                       | - 00 |
| (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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