

Ministry of Earth Sciences (MoES)
Summary of Important Developments –September, 2018

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 & 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
68	36

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

Annex-I

Important policy decision taken and major achievements:

1. India Meteorological Department(IMD)'s operational seasonal forecast for Northeast monsoon season (October-December 2018) over South Peninsula (Tamil Nadu, Coastal Andhra Pradesh, Rayalaseema, Kerala and South Interior Karnataka) indicates normal rainfall (89% -111% of Long Period Average (LPA) of 332.1 mm) with a tendency to be in the positive side of the normal.
2. The all India average rainfall during the period June 01, 2018 to September 30, 2018 was 804.0 mm which is 91% of its Long Period Average (LPA) of 887.5 mm.
3. The Atal Centre for Ocean Science and Technology for Islands (ACOSTI) in Port Blair was inaugurated by Hon'ble Minister for Science & Technology, Environment & Forest and Earth Sciences on 15 September, 2018. The activities of the centre involve offshore open sea cage culture for marine fishes, deep sea microbial technology and seawater quality monitoring. The state of the art facilities of the centre are expected to contribute to the developmental activities in the island.
4. Indian Ocean Wave 18 tsunami mock exercise (mock drill) of Intergovernmental Oceanographic Commission of UNESCO was coordinated by Indian National Centre of Ocean Information Services (INCOIS), an autonomous institute under MoES during 4th & 5th September, 2018 with close involvement of Ministry of Home Affairs, National Disaster Management Authority (NDMA), National Disaster Reserve Force (NDRF), Indian Navy, Army, Indian Coast Guard, Nuclear Power Corporation of India Limited (NPCIL) etc. During this exercise, all coastal states of India tested communication modes for receipt of bulletins from INCOIS. The end-to-end warning system involving tsunami detection and forecast, threat evaluation and alert formulation, alert dissemination to public and their awareness and response was also tested. 44 coastal districts of 9 States/UTs (Gujarat, Maharashtra and Goa on 4th September; Andaman & Nicobar Islands, West Bengal, Odisha, Andhra Pradesh, Puducherry and Tamil Nadu on 5th September, 2018) participated at community level. Over 100,000 people were evacuated from around 375 coastal villages during this exercise.
5. A side event was organised by India in association with the International Seabed Authority (ISA) on 7th September 2018 in United Nations, New York during the Intergovernmental conference on marine biological diversity of areas beyond national jurisdiction (BBNJ) with the intent of displaying ongoing activities on the deep sea biodiversity inventories particularly at the potential deep sea mining sites. A panel discussion with diplomats representing different countries on "Enhancing deep sea marine biodiversity assessment through the creation of taxonomic atlases and the ISA open Deep-sea database" was organised. The event witnessed exciting deliberations and exchange of views.

Minimum Government, Maximum Governance:

- Dissemination of Agromet. Advisories to users community through SMS and IVR technology is being continued in the country through Kisan Portal and under PPP mode. Presently 40million farmers in the country are getting advisories through SMS directly.
- Adverse weather SMS warnings 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	Commissioned so far	Data Reporting
Automatic Weather Station (AWS)	682	327
Automatic Rain Gauge (ARG)	1350	508
GPS Sonde based RS/RW Stations	43	43
Doppler Weather Radar (DWR)	25	24
Ozone (Ozone Sonde + Total Ozone)	05	05
Surface Ozone over Delhi (Electrochemical Concentration Cell)	07	07
Nephelometer	12	12
Sky Radiometer	20	16
Black Carbon Monitoring Systems (Aethalometer)	16	15
Air Quality Monitoring System (SAFAR-Delhi)	10	10
Hydromet. (IMD & Extra-departmental excluding AWS & ARG)	---	2465@
Aviation	76	76

@ 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 events:

Southwest monsoon: The Southwest monsoon was vigorous over West Uttar Pradesh, Haryana, Chandigarh & Delhi and Himachal Pradesh on 4 days each; over Odisha, Punjab and East Rajasthan on 3 days each; over Uttarakhand, Jammu & Kashmir and West Madhya Pradesh on 2 days each and over Andaman & Nicobar Islands, Sub-Himalayan West Bengal & Sikkim, West Rajasthan, East Madhya Pradesh, Gujarat Region, Vidarbha and Telangana on one day each during the month. Southwest monsoon had been active over Assam & Meghalaya on 8 days; over Sub-Himalayan West Bengal & Sikkim on 6 days each; over Uttarakhand and Chhattisgarh on 5 days each; over Arunachal Pradesh, Odisha, Bihar, Himachal Pradesh and East Madhya Pradesh on 4 days each; over Gangetic West Bengal, Bihar and North Interior Karnataka on 3 days each; over Andaman & Nicobar Islands, Nagaland, Manipur, Mizoram & Tripura, East Rajasthan, Telangana, Rayalaseema and Kerala on 2 days each and over Punjab, Jammu & Kashmir, West Madhya Pradesh, Saurashtra & Kutch, Konkan & Goa, Vidarbha and Tamilnadu & Puducherry on one day each during the month.

Withdrawal of Southwest Monsoon: In view of anti-cyclone established over Rajasthan & adjoining areas in the lower tropospheric levels, substantial reduction in moisture content over Rajasthan & adjoining areas and dry weather conditions over most parts West Rajasthan & Kutch, the southwest monsoon has withdrawn from some parts of Rajasthan, Kutch and north Arabian Sea, on 29th September 2018.

Rainfall in September 2018: Rainfall during the month of September, 2018 was large excess in 3, excess in 3, normal in 7, deficient in 16, and large deficient in 7 and no rain in 0 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month of September – 2018 has been recorded as 132.4 mm which is 76% of its Long Period Average (LPA) of 173.4 mm.

Southwest Monsoon 2018: Rainfall during the period June 01, 2018 to September 30, 2018 was large excess in 0, excess in 1, normal in 23, deficient in 12, large deficient in 0 and no rain in 0 of 36 meteorological sub- divisions. The all India average rainfall during the period June 01, 2018 to September 30, 2018 was 804.0 mm which is 91% of its Long Period Average (LPA) of 887.5 mm. Seasonal rainfall during 1 June - 30 September 2018 is provided below:

Region	Actual	Normal	<u>% Departure From Long Period Average</u>
All India	804.0	887.5	-9%
East & Northeast India	1087.5	1438.3	-24%
Northwest India	603.2	615.0	-2%
Central India	911.3	975.5	-7%
South Peninsula	704.4	716.1	-2%

Heavy Rainfall:Extremely heavy rainfall was observed on 3 days over Odisha, 2 days over Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim and West Madhya Pradesh and 1 day each over Gangetic West Bengal, East Uttar Pradesh, Punjab, East Rajasthan, East Madhya Pradesh and Vidarbha during the month.

No. of heavy Rainfall (Events):261 (Heavy rainfall events: 250, very heavy rainfall: 11) Overall (>64.4mm)

Lead Time	Skill (% correct) of spatial distribution of warnings during the month
24 Hour	79%
48 Hour	82%
72 Hour	81%

Severe Weather Systems:

Deep Depression (06-07 September) over Bay of Bengal: Under the influence of a cyclonic circulation over North Bay of Bengal (BoB) and adjoining areas of Bangladesh & West Bengal coast, a low pressure area (LPA) formed over northwest BoB and neighbourhood in the early morning of 5th September. It lay as a well marked low pressure area (WML) over the same region in the evening (1200 UTC) of same day. Moving west-northwestwards, it concentrated into a depression (D) over northwest BoB and adjoining West Bengal Bangladesh coasts in the early morning of 6th. It moved slightly westwards, intensified into a deep depression (DD) over the same region in the same morning and crossed West Bengal coast close to Digha in the same forenoon during 1000-1100 IST. It continued to move westnorthwestwards and maintained its intensity of DD for next 21 hours and weakened into a depression over northwest Odisha and neighbourhood in the early morning of 7th. Thereafter, it moved northwestwards and weakened into a Well Marked Low (WML) around the noon of same day over north Chhattisgarh and neighbourhood. It weakened into an LPA over east Rajasthan and neighbourhood in the early morning of 9th.

IMD issued regular bulletins to WMO/ESCAP Panel member countries including Bangladesh and Myanmar, National & State Disaster Management Agencies of Andhra Pradesh, Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Telangana, Uttar Pradesh and Rajasthan, general public and media. Regular Bulletins every six hourly were issued since formation of depression over northwest BoB. In addition to Press Release and SMS to registered users.

Cyclonic Storm Daye (19-22 September) over Bay of Bengal: Cyclonic Storm (CS) **Daye** originated from a low pressure area (LPA) which formed over eastcentral Bay of Bengal (BoB) and adjoining Myanmar in the afternoon of 18th September. It lay as a well marked low pressure area (WML) over the same region in the morning of 19th September. Under favourable environmental conditions, it concentrated into a Depression (D) over eastcentralBoB in the night of 19th September. Moving nearly west-northwestwards, it intensified into a deep depression (DD) over westcentralBoB in the morning (0300 UTC) of 20th September and further into a cyclonic storm (CS) “**Daye**” in the same night. It crossed south Odisha and north Andhra Pradesh coast close to Gopalpur (Odisha) as a cyclonic storm with a wind speed of 60-70 kmph gusting to 80 kmph during 0030 and 0130 hrs IST of 20th September. It continued to move west-northwestwards, weakened into a DD in the early morning of 21st, into a D in the same evening and into a WML over west Madhya Pradesh and adjoining east Rajasthan in the evening of 22nd September. It lay as a WML over southeast Rajasthan in the morning of 23rd. It lay over north Rajasthan and adjoining southwest Uttar Pradesh & south Haryana in the early morning of 24th and lay as an LPA over south Haryana and neighbourhood on 24th morning. It became less marked on 25th morning.

Thunder Squall (TS) activity during the month is given below:

S.No.	Region	TS Days	Maximum TS Activity	Squall
1.	South Peninsular India	23	25-09-18	Nil
2.	Northwest India	25	02-09-18	Nil
3.	Northeast India	30	24-09-18	Nil
4.	East India	27	05-09-18 & 14-09-18	Total 03 (Port Blair) (Two on 18-09-18 & One on 19-09-18)
5.	Central India	17	21-09-18	Nil
6.	West India	01	27-09-18	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.

Western disturbances and associated weather: During the month, five (5) western disturbances affected western Himalayan region. Out of 5 western disturbances one has caused heavy to very heavy rainfall over western Himalayan region and adjoining northwest India during 21-24th September with snowfall at high reaches of western Himalayan region, and has also caused isolated extremely heavy rain on 22nd and 23rd September over Punjab and Himachal Pradesh. Rest 4 western disturbances has caused scattered to fairly widespread rainfall activity over parts of western Himalayan region and isolated to scattered rainfall activity over adjoining plains of northwest India during the month.

Bulletins / Operational Reports/ Services

National Centre for Medium Range Weather Forecasting (NCMRWF) provided forecast for SHAR space-launch programme PSLV-C42.

All India Weather Bulletins, all India inference and severe weather warnings (120 each); Press Releases (9 Nos.); Current weather outlook and forecast for next two weeks (04); All India weekly weather reports (04) each were issued during the month.

Sixty (60) mountain weather bulletins including severe weather warnings for western and central Himalayan region were issued during the month.

A total of 30 Nowcast Guidance Bulletins were issued (daily once) during the month.

Consensus Statement on the Forecast for the 2018 October to December Season Rainfall and Temperatures over South Asia was issued in 13th Session of the South Asian Climate Outlook Forum (SASCOF-13) during 26-28 September, at Colombo, Sri Lanka.

Annual Cyclone Review-2016 was sent to WMO for publication and put up on RSMC website at the link for 9th International Workshop on Tropical Cyclones during December 2018.

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

Climate Diagnostics Bulletin of India for August 2018 was brought out.

ENSO bulletin for September 2018 and Seasonal Climate Outlook for South Asia for the months of September-December 2018 were issued. (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	116	115	108
GPS stations	40	30	27

Earthquake and Tsunami monitoring

Earthquake: 16 earthquakes were monitored in the Indian region out of which 3 events were greater than magnitude (M) of 5.0.

Tsunami: 5 seabed earthquakes (M > 6) with a potential to generate tsunami occurred. This information was provided within 12 minutes of occurrence in respect of all the events.

Ocean Observation System

Type of Platform	Target	Commissioned till September, 2018	Data received during September, 2018
Argo Floats *	200	323	143
Drifters*	150	108	2
Moored Buoys	16	22	19
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	16
Tsunami Buoys	7	9	5
Wave Rider Buoy	16	19	8

*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)	30
2	Tuna Fishing Advisories	29
2	Ocean State Forecast(OSF)-Wave, Wind, Currents, SST, MLD and D20 forecasts	30
3.	Near Real time global ocean analysis (5-day averaged)	6
4.	Real time global ocean analysis (daily)	27
5.	Coral Bleaching Alert System	10

Ocean Technology

MoU between National Institute of Ocean Technology (NIOT) and Central Institute of Brackishwater Aquaculture (CIBA) was signed to promote collaboration in hatchery technology for fish seed production, feed processing technology & nutrition and health management of fishes in offshore cage culture programmes.

Online Laboratory and Quality Management system for the NABL accredited Acoustic Test Facility was set up in NIOT in accordance with the requirements of ISO/IEC 17025: 2017 standard. It encompasses online approval process, database for laboratory management system documents, customer requests, equipments, training record for laboratory personnel, internal audit process and day to day maintenance of records.

Capacity Building and Outreach

The National Centre for Antarctic and Ocean Research (NCAOR), an autonomous institute under Ministry of Earth Sciences hosted a second international IODP (International Ocean Discovery Programme) workshop in Goa during September 17-18, 2018 to identify and improve our understanding about of several geological paradoxes in this region. About 50 international scientists took part over two intensive days of plenary and breakout sessions. This was followed by IODP Forum meeting from 19-20 September, 2018 in which 35 international participants took part.

A workshop on "Advancing Drought Monitoring, Prediction and Management Capabilities" was organised by IUKWC (India – UK Water Centre) at Lancaster University, UK, during 18–20 September 2018. About 22 scientists from India participated in this workshop. This workshop brought together in one platform key actors engaged independently in the three domains of drought monitoring, prediction and management to leverage cutting-edge drought science to inform new approaches to meet society's needs for drought planning and management.

A 3 day Teachers' Training Workshop on Meteorology was organised by India Meteorological Society, Pune Chapter in association with IITM & IMD) at IITM, Pune during 30 August to 1 September 2018. The workshop was attended by 42 participants (school & college teachers and coordinators) from various parts of the country, mainly from Maharashtra (representing more than 26 schools/ junior colleges/ organizations) and learned faculty (from IITM, IMD & CDAC) for delivering lectures to the participants.

INCOIS Conducted a "One Day Training of Trainers (TOT) on Ocean State Forecast, Information and Advisory services from INCOIS" at ST. Xavier's college, Thumba, Thiruvananthapuram on 23 Sep 2018, through tele-presence, in collaboration with ST. Xavier's college, Thumba, Xavier's Outreach Services and a risk communication & anthropology research team from Sussex University, UK. There were 65 trainers/fishers from various villages of Thiruvananthapuram attended the training workshop and user interaction meeting.

A training course was conducted by INCOIS on Operational Ocean Services, Data and Data Products for the 18 officers of Indian Coast Guard who deal with the search and rescue operations and Oil Spill control during September 18-19, 2018.

INCOIS supported the "Area level pollution response exercise - POLREX-18" conducted by the Indian Coast Guard by providing updated sea state/weather related bulletins for the sea off Mumbai region during September 16-17, 2018.

INCOIS conducted a training course on "Data Visualisation of Marine Met data (using FERRET)" under ITC Ocean during August 27-31, 2018. Twenty five (25) participants attended this course from Malaysia, India, Mauritius, Vietnam, Bangladesh, Sri Lanka, Philippines, Iran, Iran Thailand and Fiji.

Curtain Raiser Function for India International Science Festival (IISF) was held at Ministry of Earth Sciences, and National Institute of Ocean Technology.

"Swachhta Hi Seva" campaign was organised in Ministry of Earth Sciences and its organisations and attached/subordinate offices during 15 September to 02 October 2018.

During 14-28 Sept 2018 "Hindi Pakhawada" was observed in Ministry of Earth Sciences and its organisations and attached/subordinate offices. Employees actively participated in various competitions.

Utilization of Ocean Research Vessels during the month

Vessel	Days at Sea / Utilization	Maintenance/ Inspection /Scientific Logistics / Cruise Preparation	No. of Cruise
Sagar Nidhi	24	6	1
Sagar Manjusha	10	20(bad weather, maintenance)	2
Sagar Purvi	14	16(bad weather)	1
Sagar Kanya	24	6	2
Sagar Sampada	-	31(dry dock)	-

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

Subject	Publications			Ph.Ds		
	April - August, 2018	September, 2018	Total	April - August, 2018	September, 2018	Total
Atmospheric Sciences	78	14	92	-	1	1
Ocean Science and Technology	22	3	25	1	-	1
Polar Sciences	10	2	12	-	-	-

Geosciences and resources	3	-	3	-	-	-
Total	113	19	132	1	1	2

Annex II

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

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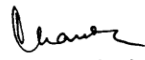
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CERTIFICATE


(FOR THE MONTH OF SEPTEMBER, 2018)

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, 2018. 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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o/c


03/10/2018