

Ministry of Earth Sciences (MoES)
Summary of Important Developments –June,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
42	31

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. The southwest monsoon covered the entire country on the 29th June 2018, against the normal date of 15th July.
2. Thirty Four(34) more stations (25 in Uttarakhand on 'Char Dham Yatra' route and 9 in J&K on 'Amarnathji Yatra' route) were added on All India nowcast Warning page of India Meteorological Department's (IMD) website for issuing three hourly nowcast.
3. The high resolution (12.5 km) ensemble (21 members) short range forecast system based on GEFS T1534 model set up at Indian Institute of Tropical Meteorology (IITM) has been operationalized. Various new model diagnostics and products have been added based on GEFS T1534 model. At present, globally this is the highest resolution (~12.5km) of short range Ensemble Prediction System.
4. Indo-US Science Colloquium was held in Goa during 11-13 June, 2018 under the leadership of Secretary, MoES and Dr. Craig McClean, Chief scientist, National Oceanic and Atmospheric Administration(NOAA) covering various aspects of Oceanography. It was attended by about 100 delegates from India and United States. This event marked ten years of US-India Science collaboration and set the course of action for the next decade in the areas of weather, climate, ocean and fisheries. India and United States expressed to work in co-operation, exchanging valuable data and findings and help each other in research and development activities in ocean and earth sciences.
5. Indian Institute of Tropical Meteorology(IITM) signed a Memorandum of Understanding with Shiksha O Anusandhan (SoA) Deemed University, Bhubaneshwar, Orissa on 21 June 2018. This MoU would facilitate joint collaboration with SoA in the area of lightening, thunderstorm and related phenomena.

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 24 million 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	345
Automatic Rain Gauge (ARG)	1350	609
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)	---	2346@
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, Modeling and Services

Significant weather events:

Advance of Southwest Monsoon: The southwest monsoon was set in over Kerala on 29th May 2018, three days prior to its normal date of onset. It covered up some parts of Odisha and West Bengal; entire Bay of Bengal and Arunachal Pradesh and most part of Assam & Meghalaya and Sikkim till 12th June 2018. A hiatus in the advance of southwest monsoon occurred during 13–22 June, due to the weakening of the monsoon circulation pattern. The southwest monsoon resumed its advance further on 23rd June, advanced over Delhi on 28th June, one day before its normal date of onset.

Depression over northeast Bay of Bengal and adjoining Bangladesh (10-11 June, 2018): In association with active monsoon conditions, a low pressure area formed over North Bay of Bengal (BoB) and neighbourhood in the evening (1730 IST) of 8th June. It lay as a Well Marked Low Pressure area (WML) over North-East BoB and adjoining Bangladesh in the morning (0830 IST) of 10th June. It concentrated into a depression (D) around noon (1130 IST) of 10th June over northeast BoB and adjoining Bangladesh near latitude 22.3°N / longitude 91.5°E. Moving nearly north-northwestwards, it crossed Bangladesh coast near latitude 23.1°N / longitude 91.2°E, south of Feni at night (around 2030 IST) of 10th June and weakened into a WML over Bangladesh and neighbourhood in the early morning (0000 UTC) of 11th June. The system caused heavy rainfall at isolated places over West Bengal, Odisha and Jharkhand on 9th and 10th, and over Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, on 11th to 13th, over Arunachal Pradesh on 13th and over Bihar on 12th.

Western Disturbances and associated weather: Six active western disturbances passed across western Himalayan region and adjoining plains of northwest India during 11-13, 14-15, 15-18, 18-20, 22-29, 29-30 June, 2018. Out of 6

western disturbances 3 caused fairly widespread to widespread precipitation and rest 3 caused isolated to scattered precipitation over western Himalayan region and adjoining plains of northwest India.

Heavy rainfall activity: Extremely heavy rain occurred at one or two places over Konkan & Goa, Coastal Karnataka, Kerala, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, East Rajasthan, East Uttar Pradesh and Gujarat Region on one or two days; very heavy at a few / one or two places over Himachal Pradesh, Gangetic West Bengal, Odisha, South Interior Karnataka, Andaman & Nicobar Islands, Nagaland, Manipur, Mizoram & Tripura, Rayalaseema and Tamil Nadu and heavy at one or two places over Uttarakhand, Saurashtra & Kutch, Marathwada, Madhya Maharashtra, Vidarbha, Telangana, Coastal Andhra Pradesh, interior Karnataka and Rayalaseema on a few days of the month of June 2018.

No. of Heavy rainfall events and Skill (% correct) during the month is as follows:

Lead Time	No. of heavy Rainfall (Events):339 (Heavy rainfall events: 226, very heavy rainfall: 113)
	Overall (>64.4mm)
24 Hour	79%
48 Hour	75%
72 Hour	76%

Heat wave: Severe heat wave conditions prevailed over some parts of Odisha, Gangetic West Bengal on 18 & 19 June and at one or two pockets of Gangetic West Bengal, Odisha, Bihar and Coastal Andhra Pradesh on 17th and over Bihar and Coastal Andhra Pradesh on 18th. Heat wave conditions also prevailed in some parts of Haryana, Chandigarh & Delhi, West Rajasthan, Uttar Pradesh and Madhya Pradesh on a few days during the first week of the month. The highest maximum temperature of 49.7°C was recorded at Churu (West Rajasthan) on 1 June 2018 in the plains during the week. The above heat wave scenario was predicted & warnings were issued about three days in advance of its occurrence.

Thunderstorm (TS) / Hailstorm and Rainfall Activity: Thundersquall & hailstorm activity during the month is given below:

S. No.	Region	TS Days	Maximum TS Activity	Hail/ Squall
1.	South Peninsular India	29	02-06-18	Thundersquall: 04(Bengaluru on 01-06-18, 04-06-18, 15-06-18, 16-06-18), Hailstorm: Nil
2.	Northwest India	28	26-06-18	Thundersquall: 06 (Safdarjung, Delhi on 01-06-18, 09-06-18) ,(Palam, Delhi on 09-06-18) (Amritsar, Punjab on 09-06-18, 22-06-18, 26-06-18) Hailstorm: 01 (Shimla, HP on 11-06-18)
3.	Northeast India	28	04-06-18 & 06-06-18	Thundersquall: Nil ; Hailstorm: Nil
4.	East India	28	25-06-18	Thundersquall: 05(Port Blair on 04-06-18: One squall, 08-06-18: Two squall, 16-06-18: Two squall) Hailstorm: Nil
5.	Central India	25	07-06-18	Thundersquall: Nil Hailstorm: 02(Bhopal on 19-06-18) (Bramhapuri on 20-06-18)
6.	West India	3	-	Thundersquall: Nil ; Hailstorm: Nil

The convective activities mentioned above was predicted and corresponding warnings were issued about 4-5 days in advance of the occurrence of the event.

Rainfall in June, 2018

Rainfall during the month of June, 2018 was large excess in 4, excess in 7, normal in 15, deficient in 8, large deficient in 2 and no rain in 0 of 36 meteorological sub- divisions. The rainfall for the country as a whole for the month has been recorded as 155.3 mm against the Long Period Average of 163.6 mm.

The rainfall distribution during the months is as follows:

Region	Actual	Normal	% Departure From Long Period Average
All India	155.3	163.6	-5%
East & Northeast India	255.9	349.9	-27%
Northwest India	80.1	69.1	16%
Central India	159.8	164.3	-3%
South Peninsula	183.8	158.9	16%

Modeling

Mesoscale versions of NCMRWF Unified Model (NCUM) at 4 km and 1.5 km horizontal resolutions with explicit rain-processes were upgraded for BIMSTEC region and local domains respectively. NCUM Prognostic dust was introduced in the model. The new model products is expected to provide more insight into the localised impact and additional mesoscale information in the short range weather prediction.

Indian Institute of Tropical Meteorology, Pune signed an MoU with North Marathwada University, Jalgaon, Maharashtra on 29th May, 2018 for strengthening scientific interactions through collaborative research work, training/workshops, internships etc.

Bulletins / Operational Reports Issued

All India Weather Bulletins, All India inference and severe weather warnings (120 each); Press Releases (10); Current weather outlook & forecast for next two weeks and All India weekly weather reports (04 each) were issued during the month.

Heat Wave Bulletins: 60 heat wave bulletins were issued during the month.

Mountain weather bulletins: 60 mountain weather bulletins including severe weather warnings for western and central Himalayan region were issued during the month.

STORM Bulletins: A total of 30 Bulletins (once daily) were issued during the month. In addition, 30 'Nowcast Guidance & Advisory' bulletins were issued during the month.

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

Disastrous Weather Events for 2015 has been published.

Climate Diagnostics Bulletin of India for May 2018 and and Pre-monsoon Season (March to May) 2018 were brought out.

El Nino–Southern Oscillation (ENSO) bulletin for June 2018 and Seasonal Climate Outlook for South Asia for the month June to September 2018 was issued. (Quick Link: [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	116	116	110
GPS stations	40	28	21

Earthquake and Tsunami monitoring

Earthquake: 27 earthquakes were monitored in the Indian region out of which 8 events were greater than magnitude (M) of 5.0.

Tsunami: No major seabed earthquake (M > 6) with a potential to generate tsunami occurred.

Ocean Observation System

Type of Platform	Target	Commissioned till June, 2018	Data received during June, 2018
Argo Floats *	200	323	147
Drifters*	150	108	4
Moored Buoys	16	20	20
Tide Gauges	36	35	27
High Frequency(HF) Radars	10	10	10
Current Meter Array	10	11	2
Acoustic Doppler Current Profiler(ADCP)	20	20	15
Tsunami Buoys	7	9	5
Wave Rider Buoy	16	17	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)	13
2	Tuna Fishing Advisories	12
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)	29
5.	Coral Bleaching Alert System	10

Ocean state forecast dissemination commenced through All India Radio stations (7 stations in Tamil Nadu) from 18th June, 2018 at Puducherry. The forecasts are being sent on daily basis to the AIR offices at Chennai, Tiruchirapalli, Karaikal, Puducherry, Nagarcoil, Tirunelveli, Tuticorin, and broadcasted regularly.

Polar Research

16 researchers from National Centre for Antarctic and Ocean Research (NCAOR), Goa presented scientific work at the international Scientific Committee on Antarctic Research (SCAR) and International Arctic Science Committee (IASC) Conference- Polar 2018 at Davos, Switzerland from June 14-23, 2018.

Dr M Ravichandran, Director, NCAOR, Goa was elected as the SCAR Vice President for a period of four years at POLAR2018- Davos during 25-26 June 2018. He will be part of the SCAR Executive Committee.

Marine Living Resources

Taxonomic studies of shelf water crabs collected from dredging operations in the Arabian Sea onboard FORV Sagar Sampada during cruise no. 340 revealed two new records of spider crabs. These include the first record of *Kasagia arbastoi* Richer de Forges & Ng, 2007 (Family Majidae) collected off Cape Comorin at 114 m depth. This species is known to occur only from the Philippines. In addition, *Chorinachus dolichorhynchus* (Alcock & Anderson, 1894) (Family Inachidae) is a new record for the Arabian Sea collected off Cape Comorin at 211 m depth. This species is previously known to occur in Red Sea, Mozambique Channel and the Bay of Bengal.

Ocean Technology

Dr.M.A.Atmanand, Director NIOT, has been elected on the Administrative Committee (AdCom) of Institute of Electrical and Electronics Engineers (IEEE) Oceanic Engineering Society (OES) from 2019 to 2021. IEEE is world's largest technical profession organization.

Capacity Building and Outreach:

As a part of Indo-US Science Colloquium held in Goa during 11-13 June, 2018, Secretary, MoES and Dr.Craig McClean, Chief scientist, National Oceanic and Atmospheric Administration(NOAA) visited NOAA's largest research vessel "Ronald H. Brown" docked in the Mormugao Port, Goa. The Colloquium was followed by the 7th Workshop under NOAA-MoES Technical cooperation on "Developing predictive capabilities for Fishery and Harmful Algal Blooms in the Indian Seas", held at Goa during 14-15 June, 2018. The workshop focused on defining the strategy to move forward under the ongoing collaboration with NOAA, USA in short (upcoming year) and mid-term.

India Meteorological Department in collaboration with World Meteorological Organization (WMO) organized "South Asia Flash Flood Guidance System (SAsiaFFGS) Follow-up Operational Workshop" during 5 -7 June, 2018 at New Delhi.

The ITCOcean, INCOIS - Ocean Teacher Global Academy (Intergovernmental Oceanographic Commission) Training Course on "Discovery and Use of Operational Ocean Data Products & Services" was held during 18-22 June 2018, at INCOIS. 25 trainees from India, Maldives, Malaysia, Indonesia, Kenya, Sri Lanka, Bangladesh, Philippines, China Indonesia, Tanzania, Vietnam, Mauritius including 7 online participants attended the course.

IMD and IIT Bhubaneswar jointly organized Training Workshop on "Extreme Weather Events over India--Observations, Assimilation and Modelling with special focus on Tropical Cyclones" during 18-25 June at IIT Bhubaneswar.

IMD organized a refresher course on "Interpretation of satellite imageries and products for weather forecasting" at New Delhi during 18-23 June 2018. About 40 trainees from different forecasting offices of IMD participated in the training imparted by the resource persons from IMD, NCMRWF, and ISRO.

NCMRWF organized a capsule course on Numerical Weather Prediction for 10 Air Force officers during 25-29 June 2018.

National workshop on Marine Biotechnology (NWMB-2018) was conducted at NIOT on 26th June 2018.

National workshop on Marine biotechnology, biodiversity and fisheries was conducted at Andaman Nicobar Centre for Ocean Science and Technology (ANCOST) on 28th June 2018.

4th International Yoga Day was celebrated on the 21st June 2018. Employees from the Ministry, attached offices, subordinate offices, autonomous institutes participated actively in the programme.

Dr Michelle Fernandes, Researcher, National Institute of Oceanography participated as Local Cruise Leader and represented India in the Leg 2.2 of the R/V *Dr Fridtjof Nansen* International research cruise in the Southern Indian Ocean (Mauritius to Sri Lanka) - A contribution to the Intergovernmental Oceanographic Commission, IOC of UNESCO-initiated Second International Indian Ocean Expedition (IIOE-2) and a part of the 2018 work plan of the EAF-Nansen (Ecosystem Approach to Fisheries) Programme, organized and sponsored by the Food and Agriculture Organisation of the United Nations (UN-FAO) from 7 – 21 June 2018. Dr.Fernandes collected water samples to study the long-term changes in biogeochemistry in the Southern Indian Ocean since World Ocean Circulation Experiment (WOCE) observations from 1995 at 80°E.

Dr. Surya Prakash, Project Scientist, NCAOR was awarded the InterRidge fellowship.

Hindi workshop on the subject 'Patrachar ke vividh Roop' was conducted on 7 June 2018 at IITM, Pune.

Utilization of Ocean Research Vessels during the month

Vessel	Days at Sea / Utilization	Maintenance/ Inspection /Scientific Logistics / Cruise Preparation	No. of Cruise
Sagar Nidhi	7	23(dry dock/statutory survey)	0
Sagar Manjusha	17	13	2
Sagar Purvi	8	22	1
Sagar Kanya	18	12	2
Sagar Sampada	24	6	1

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

Subject	Publications			Ph.Ds		
	April - May, 2018	June, 2018	Total	April - May, 2018	June, 2018	Total
Atmospheric Sciences	26	18	44	-	-	-
Ocean Science and Technology	9	5	14	1	-	1
Polar Sciences	5	-	5	-	-	-
Geosciences and resources	-	-	-	-	-	-
Total	40	23	63	1	-	1

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

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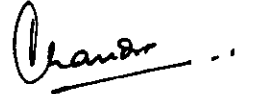
Dated, the 3rd July, 2018

CERTIFICATE

(FOR THE MONTH OF APRIL, 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 June, 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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