

Ministry of Earth Sciences (MoES)
Summary of Important Developments –August,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.	<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>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.</p>

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 :** 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
104	63

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.

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:

Rainfall forecast for Second Half of Southwest Monsoon 2017 was issued on 8th August 2017. Quantitatively, the rainfall over the country as a whole during the second half of the season is likely to be 100% of Long period Average(LPA) with a model error of $\pm 8\%$. The rainfall during August is likely to be $99 \pm 9\%$ of LPA and the seasonal (June to September) rainfall for the country as a whole is likely to be normal (96% to 104% of LPA) as it was forecasted earlier.

International Seabed Authority approved India's application for 5 year extension of contract for exploration of polymetallic nodules in Central Indian Ocean Basin. This would provide exclusive rights to India for exploration of polymetallic nodules in 75000 sq. km of Area till March, 2022.

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 21.69 Million farmers in the country getting advisories through SMS directly. Farmers database of Twenty (20) Lakh farmers have been collected from the state of Maharashtra for dissemination of Agromet Advisory.

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	Commissioned so far	Data Reporting
Automatic Weather Station (AWS)	682	343
Automatic Rain Gauge (ARG)	1350	580
GPS Sonde based Radio Sonde/Radio Wind Stations	43	36
Doppler Weather Radar (DWR)	22	20
Ozone	15	05
Surface Ozone over Delhi (Electrochemical Concentration Cell)	07	07
Nephelometer	12	12
Sky Radiometer	12	08
Black Carbon Monitoring Systems (Aethalometer)	16	16

Hydromet. (Other rain gauges excluding AWS & ARG)	---	2377
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 (August, 2017)

Western Disturbance: Seven (7) western disturbances passed across western Himalayan region and adjoining plains of northwest India during 1-9; 8-11; 12-16; 16-20; 21-22; 23-28 and 28-31 August 2017. These western disturbances interacting with lower level monsoon circulation caused scattered to widespread rainfall activity over western Himalayan region and adjoining plains of northwest India with isolated heavy falls on a few days and very heavy falls on one or two days.

Low Pressure Areas:

(a) A low pressure area formed over northwest Bay of Bengal & neighbourhood and moved westwards across south Odisha, Chhattisgarh, Vidarbha and southwest Madhya Pradesh during 18th to 21st August and became less marked on 22nd over Kutch & neighbourhood. During its life cycle, it lay as a Well Marked Low Pressure Area over southeast Vidarbha and neighbourhood on 20th August 2017.

(b) Another low pressure area was formed over southeast Odisha & neighbourhood on 27th; it lay over central parts of Odisha & neighbourhood on 28th August. It lay as a Well Marked Low Pressure Area over southwest Madhya Pradesh & neighbourhood on 29th and over northern parts of Saurashtra and adjoining Gujarat region on 30th August 2017. It lay as a low over Kutch and adjoining areas of south Pakistan and northeast Arabian Sea on 31st August 2017 and became less marked thereafter.

Modelling and Research

High resolution 4D-Var data assimilation system has been successfully configured for the regional NCM with 6 hourly and 3hourly updates by National Centre for Medium Range Weather Forecasting(NCMRWF)

Monthly, seasonal and annual area weighted rainfall time series for all - India, 5 homogeneous regions and 30 meteorological subdivisions for the period 1871-2016 have been constructed on the basis of a fixed and well distributed network of 306 rain gauge stations over India. Report is available at website of Indian Institute of Tropical Meteorology(IITM): <http://www.tropmet.res.in/~lip/Publication/RR-pdf/RR-138.pdf>.

Under System of Air Quality and Weather Forecasting And Research(SAFAR), a high resolution (1.67km *1.67km) emission inventory has been developed over Ahmedabad Metropolitan Region (AMR) (~30kmx35km domain) covering Ahmedabad, Gandhinagar city area and surrounding villages to facilitate accurate air quality forecasting. Emission inventories have been developed for 8 air pollutants viz., NOx, CO, BC, OC, PM_{2.5}, PM₁₀, SO₂ and VOCs. Study revealed that transport sector is contributing maximum to the emission of PM_{2.5}, CO, NOx, BC, OC and VOC's, maximum SO₂ emission from industrial sector whereas windblown dust is the major source of PM₁₀ emission. It also revealed several interesting features & hot spots.

Rainfall in August, 2017

Rainfall during the month of August, 2017 was large excess in 2, excess in 6, normal in 16, deficient/ large deficient in 12 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 228 mm (-13%) against the Long Period Average of 261 mm.

Extremely heavy rainfall: Extremely Heavy Rainfall (≥ 21 cm in 24 hours ending at 0830 hrs. IST of date) occurred at isolated places over Bihar on 4th; over Sub-Himalayan West Bengal & Sikkim on 8th and during 10th to 12th; over Assam & Meghalaya on 9th and during 10th to 14th; over Arunachal Pradesh on 10th & 11th; over Bihar

during 12th to 14th and over East Uttar Pradesh on 14th; over Konkan 29th& 30th over Gujarat region on 29th and over Madhya Maharashtra on 30th August 2017.

Heavy Rainfall over Mumbai: : Mumbai experienced 33 cm of rainfall mostly in 12 hrs during 0830 UTC to 2030 hrs IST of 29th August 2017. It included extremely intense rainfall spell of 16 cm during 1430-1730 hrs IST (3 hrs) of the same day. This was first predicted by IMD on 24th August in the form of a press release for the occurrence of heavy rainfall over Konkan region (five days in advance). However, it was more specifically predicted on 28th August based on the observations of 0830 hrs IST for occurrence of extremely heavy rainfall over Mumbai and adjoining suburban areas on 29th August. Special red colour bulletins on 28th and 29th were issued to disaster managers urging action to be taken in addition to the press release by IMD at Mumbai on 28th. Further, 3 hourly updates was provided on past rainfall and predicted rainfall for next 3 hrs on nowcast basis. Doppler Weather Radar, Mumbai, Automated weather stations and Departmental observatories, satellite updates and products and numerical weather prediction models were utilized to monitor, predict and issue warning against this extremely heavy rainfall over Mumbai. The forecast and warning services provided by IMD has been appreciated by disaster management authorities, press and electronic media including Municipal Corporation of Mumbai.

Heavy Rainfall Verification for the month: Total No. of Heavy Rainfall events: 447

Lead time of forecast→	24 hour	48 hour	72 hour
Percentage correct	71	68	70

Report on Cyclonic Disturbances over north Indian Ocean during 2016 was published and uploaded on RSMC, New Delhi website at the link:<http://rsmcnewdelhi.imd.gov.in/images/pdf/publications/annual-rsmc-report/rsmc-2016.pdf>.

A Report on “Monitoring Convective Activity over India During Pre-Monsoon Season- 2013 under the SAARC STORM Project” by Kamaljit Ray, Bikram Sen, Pradip Sharma was published in Vayumandal Volume 42(2),2016.

Report on “Severe Weather Events: Post-Monsoon Season (July-December, 2016)” by Kamaljit Ray and Priyanka Singh published in Vayumandal Volume 42(2), 2016.

Daily All India Weather Summary, Weekly Weather Reports and All India Special Daily Weather Reports for southwest monsoon season are being brought out on routine basis.

Climate Diagnostics Bulletin of India for July 2017 was brought out.

ENSO bulletin and Seasonal Climate Outlook for South Asia for the month of August 2017 was issued.(Link : www.imdpune.gov.in/Clim_Pred_LRF_New/Products.html).

Geoscience Research

Seismological Observational Network

Observation Type	Target for XII Plan	Commissioned so far	Data reporting during the month
Seismic stations	130	99	60
GPS stations	40	28	21

Earthquake and Tsunami monitoring

Earthquake: 20 earthquakes were monitored in the Indian region out of which 2 events were greater than magnitude (M) of 5.0.

Tsunami: 1 major seabed earthquake(M> 6) with a potential to generate tsunami were monitored. This information was provided within 12 minutes of occurrence.

Ocean Observation System

Type of Platform	Target	Commissioned till August, 2017	Data received during August, 2017

Argo Floats^	200	296	142
Drifters*	150	103	6
Moored Buoys	16	19	18
Tide Gauges	36	34	28
High Frequency(HF) Radars	10	10	9
Current Meter Array	10	11	2
Acoustic Doppler Current Profiler(ADCP)	20	21	18
Tsunami Buoys	7	9	4
Wave Rider Buoy	16	17	11

*The remaining floats/drifters have completed their life time and as such no data can be received from them.

Under Ocean observation systems programme, National Institute of Ocean Technology undertook a joint cruise with National Oceanic and Atmospheric Administration(NOAA) to retrieve and redeploy five RAMA ATLAS Buoy systems and five ADCP moorings in Equatorial waters from 5th August to 5th September 2017 onboard ORV Sagar Nidhi.

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	28
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

Forecasts of surface and sub-surface currents were provided under consultancy services to the Oil and Natural Gas Corporation (ONGC), Kakinada during August 1-6, 2017 for the installation of rig structures in Krishna Godawari basin in the Bay of Bengal.

Polar studies:

The decadal and regional trends indicate that post-2000 there is an increasing sea ice trend of 11% for Indian Ocean and 32% for Pacific Ocean sectors, whereas Ross sea sector experiences a 32% decline. Sea ice in Bellingshausen-Amundsen sector has been decreasing since 1979 by -3300 sq. km, however post-2000 an increasing trend of 11700 sq. km is seen which contributes to an overall Antarctic sea ice increase. The Weddell Sea showed an overall increase in sea ice by 19750 sq. km, as compared to a negative trend of -2450 sq. km pre-2000 scenario.

The possible mechanism of Antarctic sea-ice expansion in the Indian Ocean sector of the Southern Ocean is explored using sea surface temperature and vertical thermohaline structure (UK Met Office temperature & salinity profiles) during 1979-2015. Results indicate that sea surface freshening and cooling trend in the upper 100 m depth that favours expansion in sea-ice extent during austral autumn and winter.

Topographic surveys of Exclusive Economic Zone:

Area covered during the month: 29,200 sq. km(approx.)

Capacity Building and Outreach:

A regional climate change workshop, entitled 'Climate Proofing of Jalyukta Shivar Abhiyan (JSA): Validation' was organized jointly by Watershed Organisation Trust (WOTR), Pune and IITM on 8th August 2017 at IITM, Pune. Around 22 high level officials from Ministry of agriculture and irrigation, Govt. of Maharashtra and IITM scientists attended the workshop.

Ministry of Earth Sciences participated in the "Exhibition on Science & Technology Innovations by Scientific Ministries and Departments of Government of India " organized at the Parliament House, New Delhi during 27 July – 11 August 29, 2017.

Targeted Training Activity (TTA) 2017 on "Monsoons in a Changing Climate" was organized at the Abdus Salam International Centre for Theoretical Physics (ICTP), Triesty, Italy during 31 July to 4 August 2017. This TTA was

organized by the IITM in association with the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy and the World Meteorological Organization (WMO), Geneva, Switzerland.

The Regional Brain Storming Session of 36th International Geological Congress (IGC) was held at National Centre for Antarctic and Ocean Research (NCAOR), Goa from 17th-18th August, 2017. 9 technical sessions were held under which 29 presentations were made by experts from various national organisations /academic institutions.

A 400 kW Rooftop solar power generation plant with 1240 solar panels was installed in INCOIS Hyderabad on 18 August 2017. This will generate approximately 6 lakhs kWh per year. Twenty percent (20%) of INCOIS total annual power consumption can be met through this solar power generation plant which will eventually lead to approximate savings of Rs 18 lakhs per annum.

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	25	6	2	-
Sagar Manjusha	14	17	2	-
Sagar Purvi	5	26	1	-
Sagar Kanya	22	9	1	-
Sagar Sampada	29	2	1	-

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

Subject	Publications			Ph.Ds		
	April – July, 2017	August, 2017	Total	April – July, 2017	August, 2017	Total
Atmospheric Sciences	47	12	59	2	2	4
Ocean Science and Technology	20	1	21	-	--	-
Polar Sciences	5	1	6	1	-	1
Geosciences and resources	10	1	11	-	-	--
Total	82	15	97	3	2	5

Ministry of Earth Sciences

CERTIFICATE
(For the month of August, 2017)

It is certified that the detailed status regarding all the posts pertaining to Ministry/Department of Earth Sciences have been updated on AVMS as on last day of the month of August, 2017. A summary of the status is given below :

- (a) Total number of posts required to be entered on AVMS : 6
- (b) Number of posts filled as on date : 5
- (c) Number of posts totally vacant as on date : 1
- (d) Number of posts under additional charge arrangement : 1
- (e) Number of posts that would fall vacant during the next 06 months : Nil

Note : * A proposal for extension of addonal charge arrangements to the post of Director, NIOT, Chennai for another 6 months beyond 31.0.7.2017 has been submitted to DOp&T vide DOD no. MoES/27/04/2014 – Estt dated 25th July, 2017.

(Vipin Chandra)
Joint Secretary