

Ministry of Earth Sciences (MoES)
Summary of Important Developments –September, 2016

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 :** 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
21	29

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 contract has been signed on 26th September, 2016 with the approval of the Cabinet between Government of India and International Seabed Authority providing the exclusive rights of exploration for polymetallicsulfides in the Area near the Rodrigues Triple Junction on the Central Indian Ridge and South West Indian Ridge in international waters for 15 years. International Seabed Authority has been set up under the UN Convention on Law of the Sea with headquarters in Kingston, Jamaica to govern the legal regime of marine non-living resources in international waters.

An application seeking extension of 5 years for the existing contract for exclusive rights of exploration of polymetallic nodules in the Central Indian Ocean Basin was submitted by Government of India to International Seabed Authority on 22nd September, 2016 upon the approval of the Cabinet.

The rainfall for the country as a whole during South-West Monsoon period i.e. from 01-06-2016 to 30-09-2016 has been recorded as 862.0 mm i.e. 97% (-3%) of its Long Period Average (LPA) of 887.5 mm.

Operational forecast for the 2016 North –East monsoon season (October-December 2016) indicates that rainfall over south Peninsula (Tamil Nadu, Coastal Andhra Pradesh, Rayalaseema, Kerala and south interior Karnataka) is most likely to be normal (90% -100% of LPA). The Long Period Average(LPA) of the North-east monsoon season rainfall over the south Peninsula for the base period 1951 -2000 is 332.1mm.

Minimum Government, Maximum Governance:

Agromet Advisories are being communicated to 193 lakh farmers of the country through mobile SMS.

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 Medias.

Atmospheric Observation Systems Network

Observation Type	Target	Commissioned up to September, 2016	Data reporting
Automatic Weather Station (AWS)	675	682	393
Automatic Rain Gauge(ARG)	1350	1341	480
GPS Sonde	10	43	43
Doppler Weather Radar(DWR)	23	19	18
Ozone	17	15	15
Black Carbon Monitoring Systems (Aethalometer)	16	16	16
Other Rain Gauges excluding ARG and AWS @	-	-	2427
Aviation	--	72	72
Agro-meteorology	267	264	160

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

The indigenously designed and developed instrument **DRISHTI** for reporting the runway visual range was commissioned at Dehradun Airport.

Atmospheric Processes, Modeling and Services

Monthly Weather Summary (September, 2016):

During the month of September, three low pressure areas formed over Bay of Bengal and moved nearly west-northwestwards and caused normal to excesses rainfall activity over north peninsula and adjoining east & central India. The formation of these low pressure systems were correctly predicted 2-3 days in advance.

Extremely heavy rain occurred at a few places over Konkan& Goa, Coastal Andhra and Madhya Maharashtra; at isolated places over Bihar, Arunachal Pradesh, Assam & Meghalaya and Andaman & Nicobar Islands one or two days in during 1st, 3rd and 4th week of September. The correctness of prediction in respect of heavy rainfall warnings issued by IMD, New Delhi for 24, 48 and 72 hrs lead period during the month of September is as under.

	Correctness of prediction of Rainfall(%)		
	Heavy Rainfall (64.5 to 115.5 mm)	Very Heavy Rainfall (> 115 mm)	Overall %
24 Hour	73	91	78
48 Hour	71	89	74
72 Hour	73	90	74

The southwest monsoon withdrew from some parts of West Rajasthan on 15th September and further more parts of Punjab; some parts of Jammu & Kashmir and Haryana and some more parts of West Rajasthan on 28th September 2016.

Six western disturbances affected western Himalayan region & adjoining Plains. The effect of these western disturbances over western Himalayan region was also predicted about 3 days in advance.

The rainfall for the country as a whole during South-West Monsoon period i.e. from 01-06-2016 to 30-09-2016 has been recorded as 862.0 mm i.e. 97% (-3%) of its Long Period Average (LPA) of 887.5 mm. The details of monthly rainfall is as under:

Month	Rainfall during SW Monsoon Period 2016			Long Range Forecast(LRF) 2 nd Stage issued on 02 June 2016
	Actual	Normal	Departure from Normal(%)	
June	145.4	163.6	-11	
July	299.2	280.2	+7	107 of LPA \pm 9%
August	228.3	254.6	-10	104 of LPA \pm 9%
September	167.7	173.4	-3	
Country as a whole	862.0	887.5	-3	106 of LPA \pm 4%

Subdivision wise break-up of South West Monsoon Rainfall is as under:

Category	PERIOD: 01.06.2016 TO 30.09.2016	
	NO. OF SUBDIVISIONS	SUBDIVISIONAL % AREA OF COUNTRY
Excess	4	13%
Normal	23	72%
Deficient	9	15%
Scanty	0	0%
No Rain	0	0%

The rainfall distribution during monsoon season has been fairly well distributed over all parts of the country leading to 8.6% higher crop sown area compared to last year with significant increase of crop sown area 22.5% in pulses and 5.5% in cereals etc. No moisture stress has been reported for the rainfed agricultural productions zones in the country despite the increased percentage of sowing during the current Kharif season. Accordingly, as per the assessment of Ministry of Agriculture, increased yields of overall rainfed crops, specifically pulses, oilseeds and cereals are expected

The live storage of all major reservoirs monitored by Central Water Commission stands at 97% of the Full Reservoir Levels (FRL) as on 29th September 2016.

Atmospheric Research

The study of observations of monsoon convective cloud microphysics over India and role of entrainment-mixing shows that lateral entrainment and turbulent mixing plays a minor role for the onset of precipitation in monsoon deep convective clouds. However, small-scale mixing may still play some role in the cloud core contributing to the variance of the droplet number concentrations and spectral shape.

Monsoon Weather Reports, Maps and Crop Yield Forecast

Daily All India Weather Summary and Weekly Weather Reports are being brought out on routine basis. Four (4) weekly and cumulative Standardized Precipitation Index (SPI) maps were prepared for the weeks ending 7th, 14th, 21st and 28th September 2016 and supplied for use in Agromet. Advisory Services Bulletin. Six (6) Drought Outlook Maps based on Aridity Anomaly Index for drought monitoring for the weeks ending 26th Aug; 2nd, 10th, 16th, 23rd & 30th Sept. 2016 and six(6) Weekly Aridity Anomaly maps & reports were prepared for the week ending 24th & 31st Aug.; 7th, 14th, 21st & 28th Sept. 2016 and uploaded on IMD Pune website. Three biweekly aridity maps and reports for the period 13th to 26th Aug, 27th Aug -9th Sept. and 10th to 23rd Sept. has been prepared.

Geoscience Research

Seismological Observational Network

Observation Type	Target for XII Plan	Commissioned so far	Data reporting during the month
Seismic stations	130	99	66
GPS stations	40	28	22

Earthquake and Tsunami monitoring

Earthquake: 30 earthquakes were monitored in the Indian region out of which 4 events were greater than magnitude (M) of 5.0.

Tsunami: 5 major seabed earthquake(M> 6) with a potential to generate tsunami were monitored. This information was provided within 12 minutes of occurrence of 4 earthquakes and between 12-15 minutes for the remaining event.

Ocean Observation System

Type of Platform	Target	Commissioned till September, 2016	Data received during September, 2016
Argo Floats	200	280	132
Drifters	150	98	16
Moored Buoys	16	19	17
Tide Gauges	36	30	18
High Frequency(HF) Radars	10	10	8
Current Meter Array	10	11	5
Acoustic Doppler Current Profiler(ADCP)	20	21	18
Tsunami Buoys	7	9	5
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)	30
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)	30
5.	Coral Bleaching Alert System	11

Swath Bathymetric Survey of Exclusive Economic Zone

An area of 48,435sq kmsquare km was surveyed with acquisition of bathymetric data.

Polar Science and Expedition

A 3 member delegation led by Hon. Minister of Earth Sciences participated in the Arctic White house ministerial Conference held at Washington Dc, USA on 28th September, 2016 in which Joint Ministerial Statement was issued.

Blue Ice Areas in the Antarctic Environment have been mapped using high resolution satellite data.

Increase in Nitrogen uptake rates with decreasing temperature has been observed in the Southern Ocean during 2013 from subtropical to polar waters, which suggests that the Southern Ocean with its vast quantity of cool water may play an important role in drawing down the atmospheric CO₂.

Ocean Technology

Four container-based laboratories have been established for analysis related to cage culture, micro algal culture and ballast water treatment in the Seafront facility at Pamanji, Nellore

Capacity Building and Outreach

Indian Tsunami Warning Centre(ITWC) at Indian National Centre for Ocean Information Services, Hyderabad participated in the tsunami mock drill **IOWave16** coordinated by Intergovernmental Oceanographic Commission

of UNESCO during 7-8 September, 2016 covering the Indian Ocean region. ITEWC participated in the drill at both national and regional (TSP) level. On both the days, the drill was conducted for a duration of 12 hours and issued 15 bulletins to the stakeholders. For the first time in India, all the coastal states took active part in the drill. Around 40,000 people participated and practiced the evacuation process in 33 coastal districts of 8 states/UTs. INCOIS also held a Press meet at INCOIS and explained the purpose and modality of drill

Ms. B. Amudha, Scientist, India Meteorological Department(IMD) was awarded with WMOs-Professor VilhoVaisala Award-2016 for her work on the World Meteorological Organisation's Technical Document -IOM-117 entitled "Survey on Alternatives for Dangerous and Obsolete Instruments: Evaluation of the Questionnaire and Recommendations for Alternatives". She is the first from IMD and the Second Indian to receive the VilhoVaisala award from World Meteorological Organisation (WMO).The award was co-shared by Dr. RabiaMerrouchi from Morocco.

A Regional Training on Multi-Hazard Early Warning was conducted by International Training Centre for Operational Oceanography (**ITCOcean**) at INCOIS, Hyderabad in collaboration with WMO-UN-ESCAP(United Nations Economic and Social Commission for Asia and the Pacific) during 19-23 September 2016. Seven (7) participants from Sri Lanka, Maldives, Thailand, Bangladesh, Myanmar, Vietnam and Cambodia and six participants from India attended the Training program. Experts from INCOIS, NRSC, Republic of Korea and Regional Integrated Multi-Hazard Early Warning System, Thailand served as resource persons.

A two-week programme on WMO's **Tropical Cyclones Forecasters Training 2016** was conducted on 19th September 2016 at IMD New Delhi. Twenty (20) scientists from Bangladesh, Maldives, India and Pakistan participated in this training programme.

Report entitled, "Assessment of Summer Air Quality of Jaipur in Different Micro-environments" was released during "Air Quality Monitoring, Impact and Action Plan Workshop" held on 9th September 2016 at Jaipur, organized by Rajasthan State Pollution Control Board (RSPCB) and UNICEF, India. This assessment report is based on the results of pilot mode summer air quality monitoring campaign conducted at strategically important and unique locations using a mobile van equipped with several air quality and weather monitoring sophisticated instruments in Jaipur city.

During the Hindi Fortnight celebrated by MoES and its institutes, various events viz. Essay Writing, Poem recitation, Noting & Drafting etc were organised in which employees participated actively.

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
SagarNidhi	16	14	1	-
SagarManjusha	0	30	0	0
SagarPurvi	0	30(Dry dock)	0	0
SagarKanya	27	3	1	-
SagarSampada	28	2	1	1

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

Subject	Publications			Ph.Ds		
	April-August, 2016	September, 2016	Total	April-August, 2016	September, 2016	Total
Atmospheric Sciences	86	13	99	1	-	1
Ocean Science and Technology	23	10	33	1	-	1
Polar Sciences	19	2	21	-	-	-
Geosciences and resources	6	1	7	-	-	-
Total	134	26	160	2	-	2

