

**Ministry of Earth Sciences(MoES)**  
**Summary of Important Developments –September, 2015**

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 Cabinet/ Cabinet Committees:**

S.No.	Number of Cabinet/ Cabinet Committee decisions pending for compliance	Proposed action plan/timelines	Remarks
1.	Dt. 8/5/2009 India's submission for an Extended continental Shelf prepared by Ministry of External Affairs(MEA)	First partial submission based on Article 76 of the UNCLOS, was submitted in UN on 11 May, 2009. Second partial submission requires new geophysical survey. The data processing, analysis, Interpretation and report preparation will be completed by December 2016. The claim would be submitted by April, 2017.	The 1 <sup>st</sup> phase of geophysical survey has been completed.
2.	Dt. 27/8/2009, Continuation of programme Polar Science:-Expedition to Antarctica	Planned yearly summer (Nov.-April) and winter expeditions(Nov-Nov) to Indian Station Maitree and Bharti to be continued during the XII Five year Plan period. Winter team would continue to stay at the stations till next summer.	--
3.	Dt 19/5/2010 Acquisition of Ice-class Research Vessel	Note for Cabinet approved. The selected shipyard has sought change in certain terms and conditions of tender and price increase at the time of signing the agreement. Negotiations are continuing with shipyard.	--
4.	Dt. 26/4/2012 Monsoon Mission	Under implementation till April, 2017. Studies on the existing model and incorporation of changes in the model to improve skill by 2015. Setting up an Indian model buy 2017 followed by investigations.	--
5.	Dt.28/11/2013 Scientific Deep Drilling in Koyna	Under implementation till 2018. This includes preparatory phase for scientific deep drilling in 2014, setting up of research lab by 2016, setting up of borehole observatory, scientific deep drilling and coring, geological logging by 2018 followed by scientific investigations	--
6.	Dt.28/11/2013 International Ocean Discovery Programme- MoU between National Science Foundation and Ministry of Earth Sciences	Under implementation till 2019. This includes signing of MoU in Aug. 2014, Scientific Drilling for Indian Proposal in Arabian sea in 2015 followed by investigations.	--

**4. 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>	--

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

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

**7. Status of implementation of e-Governance : Under process**

**8. Status of Public grievances:**

No. Of Public Grievances redressed during the month	No. Of Public Grievances pending at the end of the month
30	21

**Important policy decision taken and major achievements**

India attained membership status in the Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and South-East Asian countries established by United Nations Economic and Social Commission for Asia and the Pacific(UNESCAP) – Agreement signed on 21<sup>st</sup> September, 2015 by HE Ambassador of India to Thailand and Executive Secretary of UNESCAP.

Papua-New Guinea(PNG) has agreed to establish Regional Integrated Multi-hazard Early warning Systems for Afro-Asian Region( RIMES)- regional hub to build and operate multi-hazard monitoring and early warning services to the west Pacific group of islands with the technical and capacity building support from the institutions of the Ministry of Earth Sciences, Government of India. The offer of PNG government is as per the decisions taken during the 2<sup>nd</sup> Ministerial conference of the RIMES held on 10<sup>th</sup> July, 2015 in New Delhi.

**Minimum Government, Maximum Governance**

Agromet Advisories were communicated to 115 lakhs farmers of the country through mobile SMS and IVR (Interactive Voice Response) Technology.

Adverse weather SMS warnings are being sent through mobiles to State Govt. officials / Disaster related officials /Central Govt. Organization/Common men.

Nowcasting based on Doppler Weather Radar products of Kolkata and Visakhapatnam and Cloud Top Temperatures are disseminated to all concerned users by both electronic and print media.

IMD is using intranet for updating reports and monitoring procurements apart from routine matters viz. leave application, reimbursements, etc.

National Centre for Earth Science Studies (NCESS) implemented end to end e-procurement through Central Public Procurement (CPP) Portal for all purchases worth above 5 lakhs.

**Atmospheric Observation Systems Network**

Observation Type	Target	Commissioned up to September, 2015	Existing	Total	Data reporting
Automatic Weather Station (AWS)	550	555	125	680	441
Automatic Rain Gauge(ARG)	1350	1291	--	1291	623
GPS Sonde	10	24	1	25	25
Doppler Weather Radar(DWR)	15	17	5	22	14
Ozone	17	15	--	15	15
Other Rain Gauges excluding ARG and AWS	-	-	--	-	2236@
Aviation	--	72	--	72	72
Agro-meteorology	267	264	--	264	160

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

**Atmospheric Processes, Modeling and Services****Rainfall in September, 2015**

Rainfall was excess in 4, normal in 18 and deficient/scanty in 14 of 36 meteorological sub- divisions. The actual rainfall for the month was 131.4 mm with departure of -24% from the normal.

### **Significant Weather event**

A deep depression formed over Vidarbha & adjoining areas of Chhattisgarh near Lat. 21.0°N and Long. 79.5°E, about 50 km East-South-East of Nagpur on 17<sup>th</sup> September, 2015. The deep depression moved nearly westwards and weakened into a depression over Vidarbha & neighbourhood very close to Akola on 18<sup>th</sup> of September. The deep depression caused heavy to very heavy rainfall over Vidarbha and Marathwada, Rajasthan, Madhya Pradesh, Gujarat State and Chhattisgarh on one to two days of the week.

### **Modelling**

The experimental runs with the upgraded data assimilation scheme (Hybrid-Gridpoint Statistical Interpolation scheme) of the National Centre for Medium Range Weather Forecasting(NCMRWF)- Global Forecast System (NGFS) for the whole monsoon season of 2015 has been completed. The experimental runs which used the 80 member Ensemble Kalman Filter (EnKF) ensembles, clearly showed a positive impact in the quality of forecasts during the monsoon season of 2015.

The experimental real-time extended range prediction based on 18<sup>th</sup> September 2015 initial condition was generated and is made available in <http://www.tropmet.res.in/erpas/>. This Multi Model Ensembles (MME) forecast has been prepared using CFS (T126 & T382) and GFS (T126 & T382). Each resolution of CFS and GFS is having 11 ensemble members. Madden-Julian Oscillation (MJO) forecast, minimum, maximum temperature forecasts and pentad wise temperature anomalies are also made available in the same link.

A web page for World meteorological Organisation (WMO)'s Severe Weather Forecasting Demonstration Project (SWFDP)-Bay of Bengal has been developed in the Regional Specialised Meteorological Centre(RSMC) website (<http://202.54.31.51/mme/fdp-bob/login.php>). This project involves India, Bangladesh, Myanmar, Thailand, Sri Lanka and Maldives, India as the RSMC provides daily severe weather guidance for Bay of Bengal for these countries with respect to cyclone, heavy rain, strong wind, and sea waves.

### **Monsoon Weather Reports, Maps and Crop Yield Forecast**

Daily All India Weather Summary and Weekly Weather Reports have been brought out.

Four Weekly and Cumulative Standardized Precipitation Index (SPI) maps were prepared for the weeks ending September 02,09,16,23.

Climate Diagnostics Bulletin of India for July and August 2015 has been brought out.

Weekly Drought Outlook Maps and Aridity Anomaly Reports & maps for the week ending September 02, 09, 16, 23, 30 were uploaded on IMD Pune website. Three Biweekly Aridity reports and maps for the period August 13-26, August 27- September 09 and Sept. 10-23, 2015 also have been issued.

Crop Yield Forecast at planting stage (F2) for Kharif 2015 for 14 states (Andhra Pradesh, Telangana, Assam, Bihar, Chhattisgarh, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Orissa, Punjab, Uttar Pradesh and West Bengal) were prepared for submission to Mahalanobis National Crop Forecast Centre (MNCFC).

### **Geoscience Research**

#### **Seismological Observational Network**

Observation Type	Target for XII Plan	Commissioned so far	Data reporting during the month
Seismic stations	130	85	52
GPS stations	40	27	19

### **Earthquake and Tsunami monitoring**

Earthquake: 16 earthquakes were monitored in the Indian region out of which 4 events were greater than magnitude (M) of 5.0.

Tsunami: 2 major seabed earthquakes ( $M > 6$ ) with a potential to generate tsunami were monitored. This information was provided within 12 minutes of occurrence of the earthquake for one event and between 12-15 minutes for another event.

### **Ocean Observation System**

Type of Platform	Target	Commissioned till September, 2015	Data received during September, 2015
Argo Float	200	263	126*
Drifters	150	144	7*
Moored Buoys	16	26	17
Tide Gauges	36	25	19
High Frequency(HF) Radars	10	10	6
Current Meter Array	10	11	5
Acoustic Doppler Current Profiler(ADCP)	20	21	16
Tsunami Buoys	7	7	6
Wave Rider Buoy	16	11	9

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

A team of Indian scientists participated in the Ocean Mixing and Monsoon studies cruise onboard ORV SAGAR NIDHI (21<sup>st</sup> August 2015 to 15<sup>th</sup> September 2015) and US vessel Roger Revelle (22<sup>nd</sup> August 2015 to 21<sup>st</sup> September 2015) jointly with University of Washington, Scripps Institute of Oceanography, MIT, Oregon University, Woodholes Oceanographic Institution, Indian National Centre for Ocean Information Services, National Centre for Antarctic and Ocean Research, Indian Institute of Science, etc. Both the ships conducted parallel operations in the Bay of Bengal. Glider, Lagrangian float, underway CTD, Fast CTD, Wire walkers, Drifters, Autonomous robotic boat and temperature & depth profiler were successfully deployed and operated during this cruise.

### **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)	23
2.	Ocean State Forecast(OSF)-Wave, Wind, Currents, SST, MLD and D20 forecasts	31
4.	Near Real time global ocean analysis (5-day averaged)	6
5.	Real time global ocean analysis (daily)	31
6.	Coral Bleaching Alert System	10

### **Polar Science and Cryosphere**

Studies pertaining to glaciology and climate change have been undertaken by third summer batch of Indian Arctic expedition.

Expedition to Himalaya: Differential GPS survey has been carried out in Chandra basin for geodetic mass balance study. Further, diurnal sampling (snow and melt water) for geochemistry and snow chemistry have been carried out at hydrological site of Sutri Dhaka glacier. In addition, installation, updation and regular monitoring of stakes network of selected glaciers of Chandra basin have been undertaken.

## **Marine Living Resources**

A new record of Sea pen was identified as *Gyrophylum sibogae* both taxonomically and DNA barcoding (99% sequence similarity) from Andaman Sea. A dried gill specimen handed over by Wild Life Conservation Department was identified as *Mobula japonica* (near threatened species), using DNA Barcoding. CO1 sequence of tube worm *Hyalinoecia tubicola* collected from Arabian Sea has been submitted to National Center for Biotechnology Information (NCBI) with Gene Bank accession number KT718001.

First record of the giant species of pycnogonid, *Ascorhynchus levissimus* (Loman, 1908) from the Andaman waters was obtained.

## **Ocean Technology**

A next generation Tsunami surface buoy which was indigenously designed, developed and deployed as a part of Sagar Bhoomi buoy system in Bay of Bengal, was retrieved after successful functioning for more than a year and found to be in order.

## **International Collaboration and Progress on MoUs**

### **NOAA, USA**

A Training Programme on “Fishery Stock Assessment and Ecosystem Modeling” was conducted during September 16-22, 2015 by Indian National Centre for Ocean Information Services (INCOIS), an autonomous institute under MoES in collaboration with Northwest Fisheries Science Centre, National Oceanic and Atmospheric Administration(NOAA), USA. The training programme was also made available online through e-classroom facilities. Forty one (41) participants were present physically with 10 participants online from various organisations like Central Institute of Fisheries Technology(CIFT), Fishery Survey of India( FSI), Centre for Marine Living Resources(CMLRE), Indian National Centre for Ocean Information Services(INCOIS), National Institute of Oceanography(NIO), Jadhavpur University, Andhra University, University of Calcutta, Visva-Bharati University, Kerala University of Fisheries and Ocean Studies (KUFOS), Tamil Nadu Fisheries University, Cochin University of Science and Technology, Gogate Jogalekar college (Ratnagiri), State Fisheries departments from Maharashtra, Karnataka and Tamil Nadu, Marine Biological Research Station, Ratnagiri and National Centre for Sustainable Coastal Management.

4<sup>th</sup> Workshop on “Development of predictive capabilities of Marine Fisheries and Harmful Algal Blooms in Indian Seas” was conducted at INCOIS, Hyderabad during September 23-26, 2015 under the technical cooperation between NOAA and MoES.

## **Capacity Building and Outreach**

Tsunami Standard Operating Procedure workshop was conducted for Disaster Management Officials (DMOs) of east coast of India on August 26, 2015 at INCOIS, Hyderabad, as a preparation for mock tsunami drill on September 26, 2015. Around 55 DMOs from Andhra Pradesh, Odisha, Puducherry, Tamil Nadu and West Bengal, National Disaster Response Force(NDRF), Indian Navy, Coast Guard participated in the workshop.

India Meteorological Department(IMD) and Indian Institute of Remote Sensing (IIRS), Dehradun organized a training programme on “Remote Sensing and GIS Technique Based Yield Forecast” during 31st August to 20th September, 2015. Twenty Nine(29) candidates participated in the training program.

IMD organised a training workshop on “Improvement in District Level Weather Forecast” at Thiruvananthapuram during 28th to 29th September, 2015. Many officers of IMD and State Agricultural Meteorological Centres involved in District Level Weather Forecasts participated in the workshop.

Ozone Day was celebrated on 16<sup>th</sup> September, 2015 at Govt Senior Higher Secondary School, Agatti, Lakshadweep islands. Awareness Programme and different Competitions such as Essay, Painting, Quiz etc were organized for school children.

### Promotion of Official Language

Various competitions viz., Quiz, Essay Writing, Debate, Poem recitation, Antakshari, Noting & Drafting, Dictation, Solo Song etc. were organised during Hindi Fortnight from 1-15 September, 2015 in the Ministry as well as in its institutes. On this occasion, a "Akhil Bharatiya Kavi Sammelan (National Kavi Sammelan) was organized in Indian Institute of Tropical Meteorology(IITM), Pune on 11<sup>th</sup> September 2015.

Parliamentary Committee on official languages carried out inspection of offices of National Centre for Medium Range Weather Forecasting(NCMRWF),and India Meteorological Department at Coimbatore, Delhi and Bhubaneswar.

### 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	23	6	1	1
Sagar Manjusha	22	8	3	0
Sagar Purvi	10	14	2	6
Sagar Kanya	23	7	2	0
Sagar Sampada	21	9	1	0

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

Subject	Publications			Ph.Ds		
	April–August 2015	September, 2015	Total	April–August 2015	September, 2015	Total
Atmospheric Sciences	67	11	78	5	-	5
Ocean Science and Technology	28	3	31	4	-	4
Polar Sciences	8	2	10	-	-	-
Geosciences and resources	3	2	5	-	-	-
	106	18	124	9	-	9