

**Earth System Science Organization(ESSO)  
Ministry of Earth Sciences(MoES)  
Summary of Important Developments –May, 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<br>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.<br><br>Second partial submission requires new geophysical survey for which process of chartering a seismic vessel is continuing. Depending on fair weather conditions, survey is expected to be over by June, 2015.<br>The data processing, analysis, Interpretation and report preparation will be completed by December 2016.<br>The claim would be submitted by April, 2017. | --      |
| 2.    | Dt. 27/8/2009,<br>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<br>Acquisition of Ice-class Research Vessel  | Note for Cabinet approved.<br>The agreement is being finalised.  | --      |
| 4.    | Dt. 26/4/2012<br>Monsoon Mission  | Under implementation till April, 2017.<br>Studies on the existing model and incorporation of changes in the model to improve skill by 2015.<br>Setting up an Indian model buy 2017 followed by investigations.   | --      |
| 5.    | Dt.28/11/2013<br>Scientific Deep Drilling in Koyna  | Under implementation till 2018.<br>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<br>International Ocean Discovery Programme-<br>MoU between National Science Foundation and Ministry of Earth Sciences | Under implementation till 2019.<br>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<br/>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 |
| 20  | 37   |

**Important policy decision taken and major achievements**

A High Performance computer “Bhaskara” machine with 350 TF capacity was dedicated to the Nation by Honourable Minister on 2<sup>nd</sup> June 2015 at ESSO-NCMRWF, Noida. With this, the aggregate computing power at ESSO-MoES stands at 1.1 PF (ESSO-IITM [0.75 PF], ESSO-NCMRWF [0.35 PF]), which is comparable with other leading global weather and climate prediction centres and is the largest in South East Asia dedicated for weather and climate applications

Rainfall forecast using dynamical numerical model with a lead time of three weeks has become operational. This will provide greater lead time for undertaking contingency measures by planners and policy makers.

**Minimum Government, Maximum Governance**

Agromet Advisories were communicated to 102.7 lakhs farmers of the country through mobile SMS and IVR (Interactive Voice Response) Technology.

Implemented e-Procurement for transparency, competition, fairness and elimination of arbitrariness in the procurement process at ESSO-INCOIS.

Guest house module of ESSO-NIOT has been made online as part of office automation system.

**Atmospheric Observation Systems Network**

| Observation Type                        | Target | Commissioned up to May, 2015 | Existing | Total | Data reporting |
|---|--------|------------------------------|----------|-------|----------------|
| Automatic Weather Station (AWS)         | 550    | 554                          | 125      | 679   | 484            |
| Automatic Rain Gauge(ARG)               | 1350   | 1291                         | --       | 1291  | 742            |
| GPS Sonde                               | 10     | 10+5 <sup>\$</sup>           | 1        | 16    | 16             |
| Doppler Weather Radar(DWR)              | 15     | 10                           | 5        | 15    | 11             |
| Ozone                                   | 17     | 15                           | --       | 15    | 15             |
| Other Rain Gauges excluding ARG and AWS | -      | -                            | --       | -     | 2024@          |
| Aviation                                | --     | 72                           | --       | 72    | 72             |
| Agro-meteorology                        | 267    | 264                          | --       | 264   | 160            |

<sup>\$</sup> Installed at Ahmedabad, Bhopal, Nagpur, Kolkata, Bhubaneshwar covering the monsoon trough region

@ 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 May, 2015**

Rainfall was excess in 3, normal in 14, and deficient/scanty in 19 of 36 meteorological sub- divisions.

The actual rainfall for the winter season was 54.4 mm with departure of -13% from the normal.

**Modelling**

The latest high resolution (T382 spectral resolution) research version of the coupled model (CFS Version 2) has been used to generate the experimental forecast for the 2015 South West Monsoon season rainfall (over the Indian region) using the April initial conditions with 52 ensembles. The prediction indicates below normal rainfall

A module to generate the ensemble based early warning products of extreme weather event (rainfall) was implemented. The extreme weather event (rainfall) is identified by comparing the forecasts from the NCMRWF Global

Ensemble Forecasting System (NGEFS) with the model forecast climatology which is based on the 30 year (1985-2014) Reforecast climatology.

The horizontal resolution of the NCMRWF Unified Model (NCUM) has been increased from the existing N512 (~25km) to N768 (~17km) on the new HPC system. The new version of the model will have finer details in surface features like orography and will allow smaller scale features in the free atmosphere to be resolved.

Nowcast Link on All India Nowcast Page on IMD site was created for MC Srinagar for issuing nowcast for 9 stations in the jurisdiction of DWR Srinagar, increasing the total Nowcast stations to 150.

Meteorological Service started at Kaji Nazrul Islam Airport (VEDG) , Durgapur from this month.

A MOU between IMD and Power Operation System & Corporation Ltd. (POSCO) M/o Power signed on 18th May 2015 regarding optimum use of weather information / forecasts in the planning operation of power sector.

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

Southwest Monsoon set over Andaman Sea on 16th May 2015. The southwest monsoon has advanced into southern parts of south Arabian sea & Maldives-Comorin areas and some more parts of southwest Bay of Bengal as on 31st May 2015.

All significant weather events that affected Delhi and NW-India in association with western disturbance and other significant weather systems during May, 2015 were forecasted 5-7 days in advance.

### **Geoscience Research**

#### **Seismological Observational Network**

| Observation Type | Target for XII Plan | Commissioned so far | Data reporting during the month |
|------------------|---------------------|---------------------|---------------------------------|
| Seismic stations | 130                 | 85                  | 56                              |
| GPS stations     | 40                  | 27                  | 21                              |

### **Earthquake and Tsunami monitoring**

**Earthquake:** 167 earthquakes were monitored in the Indian region out of which 13 events were greater than magnitude(M) of 5.0.

An earthquake of magnitude 7.3 occurred on 12<sup>th</sup> May 2015 at 12:35 HRS (IST) in Nepal (about 60 Km E of Kathmandu), 17 days after the 7.9 magnitude mainshock which occurred 80 km northwest of Kathmandu. The event was well recorded by the national seismological network. The epicentre of earthquake lies in the seismically active Alpid-Himalayan seismic belt. The earthquake was located at (27.7°N, 86.0°E), and felt widely in all northern, eastern and some parts of central India including Delhi. So far, 173 aftershocks, since the 25 April 2015 mainshock, have been reported by our network. Since 12 May 2015, 78 aftershocks have been reported from the region by our network. The preliminary earthquake report was disseminated to the concerned government agencies related to relief and rescue operations within 8 minutes of earthquake occurrence through mobile SMS, fax and website updation. A brief report, along with the expected intensity at various places, was prepared and sent to concerned authorities. The media was briefed about the event.

**Tsunami:** 11 major seabed earthquakes (M> 6) with a potential to generate tsunami was monitored. This information was provided within 12 minutes of occurrence of the earthquakes for 9 events, within 12-15 minute for one event and within 15-18 minutes for the remaining event.

### **Ocean Observation System**

| Type of Platform | Target | Commissioned till May, 2015 | Data received during May, 2015 |
|------------------|--------|-----------------------------|--------------------------------|
| Argo Float       | 200    | 263                         | 123*                           |

|   |     |     |    |
|---|-----|-----|----|
| Drifters                                | 150 | 144 | 8* |
| Moored Buoys                            | 16  | 26  | 18 |
| Tide Gauges                             | 36  | 25  | 21 |
| High Frequency(HF) Radars               | 10  | 10  | 7  |
| Current Meter Array                     | 10  | 11  | 5  |
| Acoustic Doppler Current Profiler(ADCP) | 20  | 21  | 16 |
| Tsunami Buoys                           | 7   | 7   | 2  |
| 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.

### **Ocean Science Services**

| No | Types of forecasts   | No. of advisories issued during the month |
|----|--|---|
| 1  | <b>Integrated Potential Fishing Zone (PFZ) advisories</b> (Sea Surface Temperature(SST), Chlorophyll., wind) | 30  |
| 2. | <b>Tuna Fishing Advisories</b>   | 6   |
| 3. | <b>Ocean State Forecast(OSF)</b> -Wave, Wind, Currents, SST, MLD and D20 forecasts                           | 30  |
| 4. | Near Real time global ocean analysis (5-day averaged)  | 6   |
| 5. | Real time global ocean analysis (daily)  | 26  |
| 6. | Coral Bleaching Alert System   | 10  |

Indian coast Guard, a central co-ordinating authority for combating oil spills, has initiated the country wide table top exercise with the help of Online Oil Spill Advisory (OOSA) developed by ESSO - INCOIS. The trajectory predictions at the spill prone zones (jetty terminals, outer harbors, single point moorings) will be done by the stakeholders. The exercise will be conducted over the extended period of May 2015 to April 2016 covering all seasons and probable locations.

### **Ocean Technology**

Olaikuda fishermen self-help group successfully cultured and harvested 7.0 tonnes of cobia in the open sea cage with the technical guidance of NIOT.

Autonomous Coring System (ACS) was qualified at 1000m water depth in the KG basin and drilling was carried out upto ~ 24 m below the sea floor.

### **Capacity Building and Outreach**

A three day training on the usage of 350 TF HPC (Bhaskara) was organized for all the scientific staff of ESSO.

ESSO-INCOIS have conducted a International training course on "Biological Oceanographic Processes during 18-22 May 2015 under ITCOOcean. Thirty two participants from all over the country including 4 participants from Sri Lanka and 2 participants from South Africa.

Third "Operational Forecasting Officers Meet-2015" (07-08 May, 2015) was held at New Delhi. The officers/scientists from ESSO-MoES, ESSO- NCMRWF NOIDA, ESSO-IITM Pune and ESSO-IMD have attended the meet.

**Utilization of Ocean Research Vessels during the month**

| Vessel         | Days at Sea / Utilization | Maintenance/ /Scientific Preparation | Logistics/ Inspection Cruise | No. of Cruise | No. of Port Calls / Port Stay/ Statutory survey |
|----------------|---------------------------|--------------------------------------|------------------------------|---------------|---|
| Sagar Nidhi    | 18                        |                                      | 13                           | 1             | 0   |
| Sagar Manjusha | 24                        |                                      | 7                            | 3             | 0   |
| Sagar Purvi    | 15                        |                                      | 16                           | 2             | 0   |
| Sagar Kanya    | --                        |                                      | 30(drydock)                  | 0             | 0   |
| Sagar Sampada  | 24                        |                                      | 6                            | 2             | 0   |

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

| Subject                      | Publications |           |       | Ph.Ds      |           |       |
|------------------------------|--------------|-----------|-------|------------|-----------|-------|
|                              | April 2015   | May, 2015 | Total | April 2015 | May, 2015 | Total |
| Atmospheric Sciences         | 10           | 12        | 22    | -          | -         | -     |
| Ocean Science and Technology | 2            | 5         | 7     | -          | -         | -     |
| Polar Sciences               | 1            | -         | 1     | -          | -         | -     |
| Geosciences and resources    | 1            | -         | 1     | --         | -         | -     |
| Total                        | 14           | 17        | 31    | -          | -         | -     |