INDIAN INSTITUTE OF TROPICAL METEOROLOGY
PASHAN, PUNE-411008

(PS/125/23/2016/EOI)

EXPRESSION OF INTEREST NOTICE

Director, Indian Institute of Tropical Meteorology (An autonomous Institute under the Ministry of Earth Science, Govt. of India), Dr.Homi Bhabha Road, Pashan, Pune- 411 008 (India) invites sealed envelope from Manufacturers / Suppliers and their accredited selling agents for expression of interest regarding supply, installation, commissioning, and satisfactory demonstration of ***"High Performance Computing (HPC) Solutions to be Installed at various ESSO-MoES Institutes"*.**

Expression of Interest (EOI) documents with details can be obtained from Purchase & Stores Section of the Institute or can be downloaded from Institute's website.

Last date of receipt of EOI at IITM, Pune : 25th October 2016 at 1200 hrs.
Opening of Envelope (Expression of Interest) : 25th October 2016 at 1500 hrs.
Date of Pre-submission discussion meeting : 22nd September, 2016 at 1000 hrs.

The Institute reserves the right to reject any or all tenders without assigning any reason thereof. For details please visit Central Procurement Portal (CPP) http://**www.eprocure.gov.in** as well as this Institute's Website: **http://www.tropmet.res.in**

Scientific Officer Gr.-II, for Director
Email : psu.iitm@tropmet.res.in

INVITATION FOR
EXPRESSION OF INTEREST
FOR

HIGH PERFORMANCE COMPUTING(HPC) SOLUTIONSAT OPERATIONAL & RESEARCH INSTITUTES INMINISTRY OF EARTH SCIENCES, GOVERNMENTOF INDIA

No:PS/125/23/2016/EOI

INDIAN INSTITUTE OF TROPICAL METEOROLOGY
(AN AUTONOMOUS INSTITUTE UNDERMINISTRY OF EARTH SCIENCES, GOVERNMENT OF INDIA)
DR. HOMI BHABHA ROAD, PASHAN,
PUNE 411 008
MAHARASHTRA, INDIA

August 2016

1. ABOUT MINISTRY OF EARTH SCIENCES (MoES) & ITS UNITS

The **Ministry of Earth Sciences** (MoES) is mandated to provide the nation with best possible services in forecasting the monsoons and other weather/climate parameters, ocean state, earthquakes, tsunamis and other phenomena related to earth systems through well integrated programmes. The Ministry also deals with science and technology for exploration and exploitation of ocean resources (living and non-living), and plays nodal role for Antarctic/Arctic and Southern Ocean research. The Ministry of Earth Sciences (MoES) is mandated to provide the nation with best possible services in forecasting the monsoons and other weather/climate parameters, ocean state, earthquakes, tsunamis and other phenomena related to earth systems through well integrated programmes.The Ministry also deals with science and technology for exploration and exploitation of ocean resources (living and non-living), and play nodal role for Antarctic/Arctic and Southern Ocean research.The various Units under the Ministry of Earth Sciences are: India Meteorological Department (IMD), National Centre for Medium Range Weather Forecasting (NCMRWF), Indian Institute of Tropical Meteorology (IITM) Puneunder the Atmospheric Sciences, Geosciences and Seismology sector; National Institute of Ocean Technology (NIOT) Chennai, National Centre for Antarctic & Ocean Research (NCAOR) Goa, Indian National Centre for Ocean Information Services (INCOIS) Hyderabad, Integrated Coastal and Marine Area Management (ICMAM) Chennai, and Centre for Marine Living Resources & Ecology (CMLRE) Kochi under the Ocean Science & Technology sector. MoES aims to create a framework for understanding the complex interactions among key elements of the Earth System, namely ocean, atmosphere and solid earth, by encompassing national programmes in Ocean science, weather, climate, environment and seismology. Improved and reliable forecast of weather and climate requires routine operations as well as research & development using very high resolution dynamical models with high complexity (e.g. coupled ocean-atmosphere-biosphere-cryosphere models). Operations of these models and the necessary R & D to improve them will be possible only if Petascale HPC facilities are acquired.

The following compute intensive major programmes are being undertaken at various MoES organizations.

- **Atmosphere and Climate Research – Modeling, Observing Systems & Services**
- **Ocean Services, Technology, Observations, Resources, Modeling and Science**
- **Polar and Cryosphere Research**
- **Seismology and Geoscience**
- **Research, Education, Outreach and Training**

The practical impact of weather, climate and ocean prediction on the world's population and economy drives this community's usage of high performance computing (HPC).

HPC requirement at MoES organizations shall increase from year to year as new programmes are initiated and existing programs are updated.

Understanding the Earth's climate and its variability has been a challenge for several centuries. Several complex processes take place in Earth's climate system. To understand the climate variability, prediction and its changes is one of the major goals of MoES.

In order to model the climate system, scientists world wide use dynamical models forsolving physical/chemical/biological equations. To simulate one day weather, the scientists integrate/solve model equations which run into the order of (depending on model)
5-10 Teraflops with a resolution of 110x110 km. Simulations and prediction are expected to be more accurate if one uses high resolution models. Scientists at MoES use very high resolution (25 km) models to simulate and predict ocean, atmospheric systems individually as well as a coupled systems.

Hence, considering the need of high computational power, MoES regularly augments its computational resources in a phased manner. Majority of MoESinstitutions have access to HPC infrastructure since 2009.

Since managing HPC systems at different constituent units is a herculean task, MoES decided in 2014 that it will manage and augment HPC facility at two Institutions, viz. IITM & NCMRWF.

The MoESAaditya HPC with 790 TF computational capacity at IITM Pune and MoESBhaskara with 350 TF at NCMRWF, Noida have the following configuration:

- The HPCS is an IBM iDataPlex cluster, having Intel Sandy Bridge processors.
- For high performance General Parallel File System (GPFS) is used. Compute node has two 8-core processors (16 cores) with its own Red Hat Enterprise Linux OS, sharing 64 GB of memory. All executions that require large amounts of system resources are sent to the compute nodes by batch job submission through job scheduler.
- IITM and NCMRWF maintains the system and provides required user support for MoES institutes including on-site training.
- In addition, the HPCS team pursues further research towards development of advance high resolution models.

USAGE OF HPC

The weather prediction requires solving, numerically, mathematical model representing the dynamical and physical processes occurring in the Earth system. These models contain complex, non-linear and time dependent partial differential equations. Solving them numerically needs huge amount of computations, which cannot be executed on single computer. So these computations are carried out in parallel on many processors that are available inAaditya and BhaskaraHPCS . The forecast models are run on hundreds of processors and produce output data for analysis. The data for single

forecast account for Terabytes in size and their analysis further requires utilization of many processors. After data analysis, the forecast results are released in theform of figures, tables or graphs in order to be understood by general public.

DELIVERABLES by HPCS

The HPCS are used extensively to produce forecast related to the following activities:

- **Seasonal and Extended Range Prediction**
- **Air pollution forecast over Indian cities**
- **R&D activities to improve forecast**
- **Thunderstorm observation/forecast**
- **Long-term climate projections**
- **Weather forecast (short and Medium range)**
- **Tsunami early warning**
- **Ocean state forecast**

Some of the above activities are being carried out by using following numerical models

- **Climate Forecast System (CFS)**
- **Global Forecast System (GFS) Global Ensemble Forecast System (GEFS)**
- **Weather Research & Forecast (WRF)**
- **IITM Earth System Model (IITM-ESM)**
- **Global Ocean Data Assimilation (GODAS)**
- **Modular Ocean Model (MOM)**
- **Direct Numerical Simulation (DNS)**
- **ECHAM6 model: Global Climate Model**
- **Large Eddy Simulation (LES) from WRF**
- **Regional Ocean Model System (ROMS)**
- **Wave Watch III (WWIII)**
- **UK MetOffice Unified Model (UKMO-UM)**
- **UK Met Office Ensemble Prediction System (UKMO-EPS)**

PURPOSE OF THIS EOI

The purpose of this EOI is to shortlist Perspective bidders for issue of RFP. Participation in the EOI is an essential and necessary condition to participate in further tendering process.

IITM, Pune on behalf of MoES is entrusted as as nodal Institute for implementation of High Performance Computing (HPC) System to enable simulation for improved weather and climate prediction.

This EOI is for augmentation of existing computing power available within MoES to the tune of 10 Peta Flops compute (99% CPU and 1% Accelerators) and 200 Petabytes

storage in the ratio of 1:3 Disk:Archive (Storage in a Phased manner). The total capacity may be distributed among ESSO-MoES Institutes at three sites. Site wise distribution details shall be made available in the RFP document.

The above computing power in Petaflop is only an indication of peak performance requirement of HPC system based on the theoretical peak of the existing MoES HPC systems. Exact requirement and selection of the systems shall be based on actual performance of the HPC systems while running a basket of benchmark suite of weather and climate models within a specified time and producing correct results as mentioned in the final tender document which will follow after successful completion of EOI process. Therefore, actual peak performance of the systems may vary according to system architecture, memory bandwidth, and interconnect switch etc.

3.0 SCOPE OF WORK FOR PROPOSED PROCUREMENT

a. For the purpose of this EOI, “vendor” or “tenderer” or “bidder” means the tenderer who is Original Equipment Manufacturer (OEM) of HPC system.

b. Supply and installation of **compute & storage requirements based on benchmark suite as per RFP** for different Institutes under MoES with the latest hardware, software and best practices of building Top Super Computers across the globe suited for weather, climate, and earth system modeling applications.

c. Supply and Installation of latest Standardized Software, Scientific Libraries, compilers for High Performance Computing Systems at different Institutes of MoES.

d. Providing 24x7 on siteoperational support for hardware, System software, application software, Storage, Maintenance, Systems Administration by the OriginalEquipment Manufacturer of HPCsystem for a period of three years post Installation and Acceptance.

e. The bidder should deploy domain application specialistsat each site of MoES for tuning, porting and optimization of application programs /models during the contract period. The number of such specialists will vary with institute.

f. Providing onsite and on system training to all concerned users at periodic interval (at least once in 6 months) as per the Service Level Agreement (SLA) and RFP details.

g. Supply and Support of any intermediate latest software, scientific libraries, compilers etc. for smooth running of weather,climate, oceanand earth system applications at regular intervals as and when the versions get upgraded periodically and without compromising the stability of the HPC system at no extra cost.

h. It is highly desirable that all the software licenses that are supplied within the scope of work are right-to-use perpetual licenses for an unlimited number of concurrent users and should be supported by respective OEMs in the name of respective MoES Institutes. For e.g.: compilers, libraries, parallel file system etc.

i. Supply and Installation of an additional research HPC system which is atleast 2 percent (out of which 50% CPU and 50% Accelerator) of the total capacity as a standalone HPC with the provision to update with latest technologies in terms of processor, interconnect, storage, software,etc. This system shall be always kept state of art during the contract period and technology refresh interval should not be more than 6 months. The purpose is to keep MoES abreast with latest technology enabling them for better planning for future requirements.

j. The bidder should collaborate and periodically (once in 6 months atleast) produce results in improvising the performance and scalability of MoES HPC applications with emerging technologies and practices.

k. Setting up the data center required to host the proposed HPC solution. MoES will provide the physical civil structure and electricity power to host the proposed HPC solution and also provide details on other infrastructure available with each of the MoES institutes. The bidder is required to provide and seamlessly integrate the necessary additional infrastructure in terms of DG power, UPS, BMS, necessary cooling, entire data center ecosystem as per the requirements of the proposed HPC solution.

4.0 Pre-qualification criteria for Participation

All the below criteria should be complied individually and collectively and should be supported by duly certified documents authenticating these aspects without which the proposal shall not be considered.

a) For the purpose of this EOI, “vendor” or “tenderer” or “bidder” means the tenderer who is Original Equipment Manufacturer (OEM) of HPC system. While OEMs may take support from System Integrators, the final Sales, Support and Services must be provided directly by OEM.

b) The bidder must have executed supply/system integration (minimum 750 Teraflops Rpeak CPU only on a single system) of similar (architecture similar to be quoted in this bid) HPC solutions in the past 3 years including High Performance Computers running operational weather, climate, ocean and earth system models.

Duly certified documents authenticating the above aspect should be enclosed in the bid document such as acceptance certificate, installation report, institute profile where such system was installed and reference from the institute etc. without which the proposals shall not be considered.

c) The bidder should be able to demonstrate minimum 95% uptime over a period of minimum 1 year with documentary evidence for a system size of not less than 1 PetaflopRpeak CPU only on a single machine.

   The bidder should submit duly certified logs, supporting letter from the buyers for authenticating above aspect.

d) The bidder should have been in existence for at least five years. Bidder should have well established service/support centre in India with trained manpower (Minimum educational qualification should be Bachelor in Engineering/Masters in Science and atleast 2 years of work experience in HPC environment) for maintaining the solution and capable of deputing these personnel at various ESSO-MoES Institutes. Bidder should provide details on technical support structure available with the vendor.

   The bidder should submit duly certified Certificate of Registration of Incorporation, Details of Service/ support centres in India (like address, manpower details as mentioned above) for authenticating above aspect.

e) The bidder should have experience in running and supporting the global atmospheric, oceanicand earth system models on at least 750 Teraflop system operationally for at least one year.

   The bidder should submit duly certified supporting letter from the buyers for authenticating above aspect

f) The bidder should have executed at least one collaborative contract with weather forecasting organization nationally/internationally. The collaborative works carried out should be demonstrated through published literature or technical documents available in public domain.

g) Bidder should not been blacklisted during last 3 years by any Central / State Government Department/Organization. An undertaking (self-certificate) is to be submitted in the form as per Annexure-1.

5.0 Benchmark Tests

A benchmark suite has been prepared and is available with the EOI on a CD/DVD/USB device along with the readme, which contains the instructionsfor running these benchmarks. The interested bidder should bring a device and collect the benchmark suite from, the Purchase Section of IITM, Pune **on or before 09thSeptember, 2016 1700 hrs**. There are a set of programs which each bidder has to run on an appropriate size of the system (as a guideline the estimated size is around 200 TFlops for the most compute intensive application in the below mentioned benchmark programs) and provide the purchaser with the outputs along with relevant logs. This is to only

demonstrate the bidders' capability to port and run the benchmarks. The benchmarks should be run by the OEM only who is responding to this EOI. Benchmark submitted by any third party will not be accepted. MoES may request for demonstration of successful porting and running of the applications on OEM's HPC system.

The following are the benchmark programs:

Regional Ocean Modelling System (ROMS)
Local Ensemble Transform Kalman Filter assymilation system on Modular Ocean Model Version 4.1 (LETKF MoM4p1)
Weather Research and Forecasting model (WRF version)
Grid- point Statistical Interpolation assimilation system (GSI)
Global Forecast System Eulerian version (GFS)
Climate Forecast System V2 (CFS V2)
Direct Numerical Simulation of clouds (DNS)
Met Office Unified Model(UM 1024)
Met Office Unified Model (UM512**)**

5.1 Benchmark Requirements

Bidders must submit benchmark results. The runtime configurations and software environment used for the above benchmarks along with detailed system configuration must be provided along with the results. The bidders are not allowed to do code level optimization of the benchmark programs. If there are any modifications to enable porting and execution of the benchmark programs on the vendor's machine, the modification details should be submitted.Any system level configuration changes to support porting and execution of the benchmark programs should also be clearly detailed and submitted along with the results.

MoES reserves the right to re-run the modified codes on OEM's system, if required. The bidders are also required to provide all the original output and log files on a readable media for verification and also required to provide the final details as listed in README file of each application.

Bidders are encouraged to submit the benchmark details on different system solutions so as to identify the pros and cons of various solutions.

6.0EVALUATION PROCESS:

Step1: Interested bidders may express their willingness in writing by responding to all the points mentioned in **Section 4 and Section 5 above** with documentary evidencebefore last date of submission.

Step2: It is mandatory to meet all the prequalification criteria of section 4 failing which bidder may be disqualified.

Step3: It is mandatory to run and submit results for all the benchmarks programs mentioned in section 5 failing which bidder will be disqualified.

Step4: MoES shall review the proposals and call the bidders for a presentation or clarification if required.

Step5: MoES will short list the bidders based on details provided in response to section 4and 5 above and other relevant documents.

Step6: The short listed bidders will only be allowed to participate in the next stage of tendering process.

7.0 Instructions to Bidder

a) The Director IITM reserves the right to cancel the EOI/tendering process at any time without assigning any reason thereof. Director, IITM, Pune will not be held liable for any loss which may incur to any bidder because of this cancellation.
b) An undertaking (self certificate) is to be submitted that the Bidder has not been blacklisted by any Central/State Government Department/Organization.
c) Please note that all the pages of the EOI documents should be signed with date and seal of the Bidder.
d) The bidder shall complete the Bid Form (Annexure-2) as furnished in the bidding documents. These forms must be completed without any alterations to its format and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested. The Bid Form shall be submitted with the bidding documents.
e) The covering letter and the Proforma given in this document should be submitted on bidder's company Letter Head, along with the technical proposal.
f) Canvassing in any form would disqualify the bidder form further participation.
g) All the submitted proposals will be scrutinized on the basis of documents and information furnished by company/ industry along with the prescribed proforma mentioned elsewhere in this document.
h) Director, IITM, Pune may obtain clarifications wherever required from the company or from the referred client list in the profile. Proposals shall be shortlisted based upon the scrutiny, offers of those companies / industries that fulfill the prequalification criteria, presentation / interaction on proposed methodology, benchmark and other conditions as stated above.
i) RFP document shall be issued only thosebidders who will qualify this EOI.
j) The Bidders should fill the Proforma-I as attached and sign on all pages.
k) The Bidders should sign on each page in their response to this EOI.
l) To evaluate a bid, the Institute shall only use all the factors, methodologies and criteria defined in Clause No. 4 & 5. No other criteria or methodology will be used.

8.0 EOI Documents: EOI shall contain the following documents:

a. In addition to the Supporting documents for section 4 & 5 the following documents should be submitted.
b. Company profiles including organizational structure with details of ownership and evidence of incorporation.
c. Evidence of technical & financial capability, including annual audited accounts for the past five (05) years ending March 31,2016. Certificate from Charted Accountant for the Net worth Criteria.
d. Detailed information on key technical Strengths in understanding Weather & Climate applications and codes and deployed HPC solutions for the same.
e. Suggestions and views, if any for HPC Solution requirements of MoES.
f. Submission of EOI: EOI shouldbe submitted in a sealed envelope clearly marked **"EOI for High Performance Computing Solution Systems - 2016"**
g. The benchmark details along with configuration of the of the system used
h. Modified codes in a separate media (e.g. CD/Tape, USB disk etc.)
i. Technology (Compute nodes, network, Storage, Operating System etc) development roadmap of the bidder for the next five years.
j. Details of the manpower required to maintain the system on 24x7 basis at 99.5 % uptime on quarterly basis.

Addressed to

The Director,
Indian Institute of Tropical Meteorology
Dr.HomiBhabha Road, Pashan,
Pune 411 008
Maharashtra
India
Phone: +91-20-2590-4200
Fax : +91-20-2586-5142

Last date of submission of EOI is **25thOctober, 2016** up to **1200hrs.**& will be opened **on the same day at 1500 hrs.**

Last date for collection of benchmark suite is **09thSeptember, 2016 1700 hrs.**

Date of pre-submission discussion meeting is scheduled on 22nd September, 2016 at 1000 hrs. at IITM, Pune. Queries if any, on this EOI may be submitted in writing on or before 16th September, 2016 up to 1700 hrs.

Note:

1. For any clarification the bidders are advised to contact Purchase officer, Indian Institute of Tropical Meteorology, Dr. HomiBhabha Road,Pashan, Pune, Pincode-411008, Maharashtra, India, Phone: +91-20-2590-4200 Fax : +91-20-2586-5142 email: psu.iitm@tropmet.res.in

PROFORMA - I

INDIAN INSTITUTE OF TROPICAL METEOROLOGY

(AN AUTONOMOUS INSTITUTE UNDER MINISTRY OF EARTH SCIENCES, GOVERNMENT OF INDIA)

TENDER NO.

1. Particulars of Applicant Company								
Name of the Company								
Registration No.								
Address						STD Code Tel. No.1		
						Tel. No.2		
						Fax No.		
	City					Pin		
	State			E-mail *				
Website Address								
Type of company	Government		Public Sector Undertaking			Private Limited		
	Partnership		Public Limited			Proprietorship		

* Email sent on this address will be treated as valid communication. Add a separate sheet, if necessary

2. Particulars of Managing Director/CEO/Proprietor/Managing Partner						
Name & Designation	Address				STD Code	
					Tel. No.1	
					Tel. No.2	
					Fax No.	
	City				Mobile	
	State		Pin		E-mail	

3. Particulars of Contact Persons

S No.	Name & Designation	Address	Numbers

1.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	

S No.	Name & Designation	Address	Numbers	
2.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	
3.			STD Code	
			Tel. No.	
			Fax No.	
		City: Pin Code:	Mobile E-mail	

4. Location of Offices in India				
S No.	Name of Head	Address	Numbers	
1.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	
2.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	
3.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	

5. Turnover for last three years		(All amounts in Indian Rupees and in Croresonly)	
Year	**Period (Month/Year) From To**	**Total Turnover of the Company**	**Turnover from HPC Projects.**
2013-2014			
2014-2015			
2015-2016			

6. Certifications	**Yes/No (Indicate the level wherever it is applicable)**	**Valid up to**

7. Experience in deploying HPC Solutions	**Site**	**Details &Date of Installation**

Add a separate sheet, if necessary

8. Details of sites/customers where similar solutions deployed						
Sr. no	Name & Address of Customer	Contact Person &Tel.No	HPC details	Value in crores(optional)	Applcations being used (optional)	Date of Installation
8.1 Projects completed during last 3 years						
1.						
2.						
3.						
8.2 Projects completed prior to last 3 years						
1.						
2.						
3.						
Add a separate sheet, if necessary Note: Attach explanatory note for each project in not more than two pages.						

9.0 Any other information that Applicant Company wants to give

Add a separate sheet, if necessary

12. List of Enclosures	
(i)	
(ii)	
(iii)	
(iv)	
(v)	
(vi)	

Undertaking

This is to certify that I have gone through all the pages of the document. The applicant company undertakes to abide by all the terms & conditions mentioned in the EOI tender document. It is further certified that the information furnished in the EOI documents is true and correct.

In the Event of any of above information found to be false, we understand that our EOI proposal can be rejected and not considered.

Date: Signatures:

Place: Name:

Seal Designation:

ANNEXURE-1

Non-Black listing Self Certificate

This is to certify that M/s. _____has not been blacklisted by any Central / State Government Department / organization in last 3 years.

Authorised Signatory

Name:_____

Designation: _____

Annexure-2

Date:

BID FORM

To,
The Director,
Indian Institute of Tropical Meteorology,
Dr. HomiBhabha Road,
Pashan
Pune 411 008

Ref: Invitation for EOI No.PS/125/23/2016/EOI.

We, the undersigned, declare that:

A) We have examined and have no reservations to the EOI Documents, including Addenda (if any) issued in accordance with Instructions to Bidders.

B) We offer to execute in conformity with the EOI Documents for providing **HIGH PERFORMANCE COMPUTING (HPC) SOLUTIONS AT OPERATIONAL & RESEARCH INSTITUTES IN MINISTRY OF EARTH SCIENCES, GOVERNMENT OF INDIA**for the The Director, Indian Institute of Tropical Meteorology, Dr. HomiBhabha Road, Pashan, Pune.

C) We also declare that Government of India or any other Government body has not declared us ineligible or black listed us on charges of engaging in corrupt, fraudulent, collusive or coercive practices or any failure/lapses of serious nature.

D) We also accept all the contents, terms and conditions of this EOI document and undertake to abide by them, including the condition that you are not bound to accept the bid that does not fulfill criteria specified in EOI.

Yours sincerely,

Authorised Signatory

Note: Authorized person shall attach a copy of Authorization for signing on behalf of Bidding company.

Full Name and Designation

(To be printed on Bidder's letterhead)