**INDIAN INSTITUTE OF TROPICAL METEOROLOGY**
**PASHAN, PUNE-411008 (INDIA)**
***(An Autonomous Body under the Ministry of Earth Sciences, Govt. of India)***

**Notification NO.: IITM/CAIPEEX-UAV/2014-2015/1**

**GLOBAL PUBLIC NOTIFICATION**

**REQUEST FOR INFORMATION FOR UNMANNED AERIAL VEHICLE FOR ATMOSPHERIC RESEARCH**

Director, Indian Institute of Tropical Meteorology, Dr.Homi Bhabha Road, Pashan, Pune- 411 008 (India) invites sealed **Request for Information (RFI) for UNMANNED AERIAL VEHICLE FOR ATMOSPHERIC RESEARCH** from reputed agencies / companies in the prescribed format.

Last date of receipt of RFI at IITM, Pune: **26 NOVEMBER 2014 at 12:00 hrs.**
Opening of RFI: **26 NOVEMBER 2014 at 15:00 hrs.**

The eligibility criteria and other details of the RFI can be downloaded from IITM's website **www.tropmet.res.in** and CPP Portal: **www.eprocure.gov.in.**

The vendors may seek clarifications, if any, through faxes / electronic mail / letters addressed to The Director (IITM), at the above address or Fax: +91-20-2586-5142 or email: psu.iitm@tropmet.res.in latest by **12th November 2014**.

The Institute reserves the right to reject any or all RFI without assigning any reason therefore.

**Assistant Manager, for Director**
Email: **psu.iitm@tropmet.res.in**

# INDIAN INSTITUTE OF TROPICAL METEOROLOGY (IITM)

(An Autonomous Research Institute under the Ministry of Earth Sciences (MoES), Govt. of India)
Dr. HOMI BHABHA ROAD, PASHAN, PUNE-411 008, INDIA
Fax: +91-20-2586-5142 or email: psu.iitm@tropmet.res.in

## GLOBAL PUBLIC NOTIFICATION

## No. IITM/CAIPEEX-UAV/2014-2015/1

## REQUEST FOR INFORMATION FOR UNMANNED AERIAL VEHICLE FOR ATMOSPHERIC RESEARCH

Indian Institute of Tropical Meteorology, Dr. Homi Bhabha Road Pashan, Pune- 411 008 (India), an autonomous R&D institution under Ministry of Earth Sciences (Govt. of India) invites Request for Information (RFI) from reputed agencies/companies in the prescribed format for Unmanned Aerial Vehicle (UAV) for atmospheric research. UAV, equipped with scientific instrumentation, will be utilized to collect research data in the lower troposphere. The eligibility criteria and other details of the RFI can be downloaded from IITM website **www.tropmet.res.in** as well as Government of India's Central Procurement Portal (CPP) **www.eprocure.gov.in**

1. The experience and capability of the agencies/companies should be provided in the prescribed format along with all the necessary supporting documents including company profile, letters of appreciation/references.

2. The proposals should contain Data sheets of all subsystems of the UAV.

3. Proposals for all the models that comply with the IITM's technical specifications are requested.

4. The offers for RFI sealed in a cover and super scribed "**RFI FOR UNMANNED AERIAL VEHICLE for ATMOSPHERIC PROCESS STUDIES**" should reach DIRECTOR, IITM, Dr. HOMI BHABHA ROAD, PASHAN, PUNE-411 008, INDIA by the **due Date i.e. 26th November 2014 ; Time 1200 hrs (IST). The sealed envelopes will be opened the same day at 1500 hrs (IST).** The sealed covers containing RFI not superscribed as above are liable to be ignored. For any clarifications/queries please contact through contact details provided above.

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## 5. Technical specifications and requirements for UAV

IITM is interested in operating UAV with the following typical specifications and requirements.

| | |
|---|---|
| **Configuration** | Airframe with electric and/or gasoline engine driven pusher propeller. |
| **Payload (Scientific instruments)** | 5 to 6 kg |
| **Maximum Altitude** | 3 km |
| **Endurance** | Min 3 hrs |
| **Maximum Operating Range** | 10 km (Line Of Sight)<br>without any communication problems of "dropping packets" |
| **Aircraft cruising Speed /Max speed**<br>**Minimum speed** | 60 kmph / 100kmph<br>25 m/s |
| **Flight controls** | Manual and Autonomous<br>As well as loiter/hold capability; return home on any failures |
| **Navigation system** | DGPS/GPS & waypoint - Autopilot system |
| **Radio Control link** | 2 km |
| **Telemetry real-time** | 10 km radius |
| **Compartments/space for scientific payload** | As per requirement |
| **Take off / recovery** | Wheeled, additional features preferable |
| **Ground Control System (GCS)** | Auto and manual mode<br>Ground control software and laptop<br>RC for manual flight operations<br>With feasibility of satellite based phone (or iridium phone) for long range flights. |
| **Environmental conditions** | -20 ˚C to +60 ˚C, cross wind handling 40 kph, Relative humidity 0 to 100% |

| | |
|---|---|
| **Payload characteristics** | See Table1 |
| **Power requirement** | See Table1 |
| **Data links and transfers** | Realtime data down linking to ground computer (through ground control system) in the field for verifying the data collection.<br><br>Accessibility to Telemetry data files at the end of each mission.<br><br>Mandatory parameters which should be recorded / telemetered in each flight are – 1) GPS Time, 2) GPS Altitude, 3) Attitude of the vehicle, 4) Lat & Long, 5) Data from each instrument. |
| **Integration of navigation system and payloads** | Should have Established plans for integration.<br><br>Conduct instrument and aircraft compatibility tests. |
| **Mission Fuel capacity** | 87 octane grade preferred for gasoline engines (or any, which can be procured without any difficulty). For electric engines, ensure endurance requirements. |
| **Ground support system** | Power supply system, engine starter (GPU), transportation of the system, field repair kit.<br><br>Additional supporting systems as required to operate and maintain (itemize) |
| **Training** | Operations and maintenance for O level facility |
| **Contingencies and responses to predictable events (like, what happens if there appears to be flight problem after launch; what happens if a UAV loses power; loss of telemetry, etc)** | Should have Established (predetermined) plans for execution |
| **Track record** | Prior experience if any (accumulated flight hours for any purpose) |
| **Expectations** | Quick Professional technical support to address the problems |

**Table 1: IITM supplied instrumentation and payload characteristics**

| Parameter | Instrument | Weight in Kg | Power (amp hours) @28V | Dimension/Volume |
|---|---|---|---|---|
| Aerosol | Condensation Particle Counter (CPC) | 1.000 | 0.1 | 250 x 120 x 70 mm |
| | Optical Particle Counter (OPC) | 0.500 | 0.2 | ~ 96 x 60 x 34 mm |
| | Micro- Aethalometer | 0.400 | Internal rechargeable lithium-ion battery | 117 x 66 x 38 mm |
| Solar Radiation | Pyranometers - 2 nos | ~ 1.400 | <0.01 | ~ 150 W x 95 H mm |
| | PAR Sensors – 2 nos | ~ 0.100 | <0.01 | 24 Dia. x 25.4 H mm |
| Wind | Turbulence probe with data computer | 0.114 | <0.01 | (0.32 mm length)<br>98 gm (42x78x49 mm) |
| T, P, RH | Radio Sonde sensor and/or Probes for Relative Humidity + Air Temperature + Pressure | 0.150<br>0.300 | 9-12 V<br><0.01 | 220 x 80 x 75 mm |
| | Aerosol Inlet | 0.200 | As it is custom built, Vendor can also propose suitable aerosol inlet with technical details for integration. | |
| | Data Acquisition System | Integration of all the proposed instruments and data acquisition – to be worked out by the vendor in close association with IITM scientists. | | |
| | Cables / Tray | | | |
| | Rechargeable Batteries | | | |

***Instrument weights and power mentioned above are tentative. They may vary slightly.*

**Specifications/position of each of the above payload:**

Payload 1: **Aerosol-Solar Radiation - instrument platform**

In this configuration, except solar radiation instruments, all other instruments should lie within the fuselage of the platform. Solar radiation instruments protrude (~5 cm) outside of the fuselage (one upward and one downward side of the fuselage). Moreover, we need an opening at the front side of the fuselage for aerosol sampling inlet (i.e., inlet for air sampling).

Payload 2: **Turbulence- instrument platform**

The turbulence probe position to be determined after the CFD analysis or through already established literature. CFD analysis should be demonstrated through simulations.

Payload 3: **Meteorological parameters – instrument platform**

Temperature, Relative Humidity and Pressure sensors should be placed above the air frame at suitable uninterrupted position.

## 6. UAV specific requirements

a) UAV should be built to accommodate proposed scientific payload that are wing or fuselage mounted.
b) UAV should be sturdy, rigid and robust. Should be capable of flying under calm to moderate weather conditions (-20 ˚C to +60 ˚C, cross wind handling 40 kph, Relative humidity 0 to 100%) with all necessary safety equipment onboard to land safely in case of any failure.
c) Gimbal mounts are desirable for solar radiation sensors.
d) Based on the proposed instruments, instrument integration plan with schematic is highly preferable.
e) Data storage should be onboard as well as online at the ground station through telemetry.
f) Complete details of capable flight modes.
g) Details of built-in sensors like Navigation and Data Acquisition.
h) Mobilization of the UAV.
i) Environmental and airworthiness certification details of the UAV.

j) Comprehensive maintenance schedule of the UAV.

k) Details about the training for UAV operations and maintenance.

l) Life time and reliability of the UAV.

m) Typical warranty and post warranty mechanisms.

n) Pilots and engineers should be available on call, at least during the first year.

o) Demonstration capability with some of the instrumentation onboard is desirable.

## 7. Required important technical parameters

### 1. Technical Information of UAV

| Sl No | Information Required | Vendor to specify |
|---|---|---|
| (a) | Range with maximum take-off weight | Provide tech info |
| (b) | Payload capacity | Provide tech info |
| (c) | Capable of interfacing the instrument(s) data with the avionics suite – please describe the avionics systems to be interfaced. | Provide tech info |
| (d) | Data on vibration of the airframe for electric and gasoline engine driven UAVs. | Provide tech info |

### 2. Additional information

- Please provide details on the atmospheric/environmental conditions the UAV can withstand (e.g., wind, turbulence etc. along with intensity values).
- Status (whether Operational/Developmental)
- Base in India for technical support.
- Additional room to incorporate more instruments in future.

### 3. Logistical Support

Any other relevant information on capability of roles & additional facilities may also be specified.

**Note: Vendors may require to give a presentation on their RFI responses within 15 days from the last date of submission. Exact date of presentations will be intimated.**