

Memorandum of Understanding (MoU)
For
Installation of Short-Range X-Band Polarimetric Scanning
Doppler Weather Radar at Amity University Maharashtra, Mumbai,
Mumbai - Pune Expressway Campus

Between

Indian Institute of Tropical Meteorology,
Pashan, Pune 411008, Maharashtra, India



And

Amity University Maharashtra, Mumbai,
Mumbai - Pune Expressway,
Panvel, Mumbai, Maharashtra - 410206



This MOU is entered into on the day of **September 12, 2022**, place **Amity University Maharashtra, Mumbai, Panvel Campus** and is effective from 12/9/2022.....

BETWEEN

Indian Institute of Tropical Meteorology (hereafter IITM), Dr Homi Bhabha Road, Pashan, Pune 411008, India (being represented by its (designated person), Shri/ Smt. (vide No. **Dr. R. Krishnan, Director**, dated 12/9/2022) hereinafter, in short, called as "**IITM**" (which expression shall where the context so admits include its successors and permitted assignees) of the **one part**

AND

Amity University Maharashtra, Mumbai (hereafter AUM), Mumbai - Pune Expressway, Bhatan, Post – Somathne, Panvel, Mumbai, Maharashtra - 410206, India (being represented by its (designated person), Shri/ Smt. (vide No. **Dr. Hira S. Vyas, Registrar**, dated 12/9/2022) hereinafter, in short, called as "**AUM**" (which expression shall where the context so admits include its successors and permitted assignees) of the **other part**.

1.0 Preamble:

Whereas, **Indian Institute of Tropical Meteorology, Dr. Homi Bhabha Road, Pashan, Pune 411 008 India** (hereinafter referred to as “IITM” which expression shall where the context so admits include its successors and permitted assignees) of the one part and **Amity University Maharashtra, Mumbai, Mumbai - Pune Expressway, Bhatan, Post – Somathne, Panvel, Mumbai, Maharashtra - 410206, India** (hereinafter referred to as “AUM” which expression shall where the context so admits include its successors and permitted assignees), of the other part, both being parties to this MoU;

And Whereas, IITM is an autonomous research organization fully funded by the Ministry of Earth Sciences (MoES), Government of India. IITM is a premier Institute of national and international repute, devoted to doing basic and applied research in meteorology and atmospheric sciences that has potential application in various fields such as agriculture, economics, health, water resources, transportation, communications, etc. More details can be found at <http://www.tropmet.res.in>;

And Whereas, AUM Mumbai is a premier educational institute that has been established under Maharashtra Govt. Act of 2014 of Government of Maharashtra and is recognized as per Section 2(f) of the UGC Act with the rights to confer degrees. More details can be found at <https://www.amity.edu/mumbai/>.

2.0 Effective Date and Duration of the MoU:

This MoU is effective from the date of its signing and is valid for a duration of **5 (Five)** years from the date of signing. It may be extended further in writing based on mutual consent.

3.0 Scientific Objectives:

Mumbai and its adjoining regions receive abundant rainfall during the monsoon, which sometimes leads to extremely heavy rain causing substantial destruction of life and properties. The information on rainfall intensity and location are also important for several societal benefits (from hydro-geological risk management to hydroelectric power management, from road maintenance to emergency planning, from tourism to real-time traffic management) and meteorological applications (e.g., nowcasting, mesoscale model validation etc.) and disaster management applications (flood warning).

Two instruments are commonly used for rainfall measurements: Rain gauge and weather radar. Rain gauges provide relatively accurate point rainfall estimates near the ground surface; nonetheless, they cannot sufficiently capture the spatial variability of rainfall, which has a significant impact on hydrological systems and thus on runoff modelling, particularly in urban areas. Thus, a dense rain gauge network is required.

IITM and India Meteorological Department (IMD) collaborated with State Government Municipal corporations, disaster management departments, Railway departments for logistics to set up Automatic Rain Gauge (ARGs) network in Mumbai. The ARG network provides rainfall information at every 5 km resolution in the Mumbai metropolitan region. The rainfall information is available in real-time through the mobile application "Mumbai Weather Live" and the real-time data available at "mumbairain.tropmet.res.in".

It is to mention that the dense rain gauge networks cannot cover large areas due to practical limitations, and thus, it is challenging to forecast rainfall with a longer lead time based on rain gauge data only. A weather radar is an alternative (equivalent to millions of rain gauges) that can better capture the spatial and temporal variability of rainfall fields, thus improving the short-term predictability of rainfall.

Given this, IITM planned to establish a network (4 numbers) of short-range X-

band weather radars to provide high-resolution (at every 500 m and 5 minutes time interval) rainfall maps in real-time over Mumbai and adjoining regions, especially on the North Konkan side. These four state-of-the-art radars are proposed to install in Panvel, Kalyan Dombivilli, Vile-Parle and Vasai-Virar regions. Further to mention that this would be the first of its kind “Urban Weather Radar Network” in India that will strengthen the weather services and provide the best disaster management strategy in Mumbai and adjoining areas.

This high-resolution rainfall dataset from the radar network will be shared online with Maharashtra State Disaster Management Authorities and concerned Municipal Corporation Offices covered under. The information from radar networks will help more details on weather and flood warning applications.

4.0 Background of the MoU:

- 4.1 The radar installation site, AUM was selected after extensive evaluation through IITM's to set up the radar network in Mumbai. IITM scientists have interacted with Dean Academics-AUM and found several academic and research topics of mutual interest between the two Institutions.
- 4.2 A team of scientists from IITM visited AUM and discussed the possibility of installing one short-range X-band radar over the region. Engineers from IITM and Central Public Works Department (CPWD), Government of India, also visited AUM to assess the feasibility of civil works for radar installation. It is further suggested to execute an MoU with AUM for establishing the radar facility.

5.0 Scope of the MoU:

- 5.1 IITM, in consultation with AUM, identified the mummy terrace of the main building as the location for installing the X-band radar. The radar system (size

about 6 x 6 feet; weight about ~360 kg) will be placed in 15 feet tower (Aluminum/MS) on the mummy terrace. The radar control room (AC enclosure, size about ~12 x 12 feet; weight about ~4000 kg) will be placed on the terrace. The IITM will carry out the necessary civil construction work to install the radar system.

- 5.2 IITM will transport the radar instruments to the site to set up the radar at AUM.
- 5.3 AUM will extend local logistical support by providing provisions for installing the X-band radar.
- 5.4 The expenditure to be incurred for limited construction, civil and electrical works required for radar installation will be borne by IITM.
- 5.5 IITM will provide necessary documents/letters to AUM for radar installation.
- 5.6 AUM will provide all necessary details and information on the civil works required by IITM to install the radar system before execution. IITM will intimate AUM about the civil works, other details on radar installation on a regular basis.
- 5.7 Installation of the radar system will be undertaken by the experts from IITM as well as from IMD, Enterprise Electronics Corporation (EEC), USA and Environmental Instruments, New Delhi. IITM will provide prior intimation to AUM about their visits for installation, checking, maintenance and calibration of the radar system.
- 5.8 IITM shall not cause any hindrance to any of the activities of AUM, and IITM's interest is only to install the radar system and collect valuable data sets.
- 5.9 AUM shall not demand rent for the space allotted on its premises to IITM to install a radar system and is expected to benefit from the state-of-the-art facility for their academic/research activities.
- 5.10 Electrical power requirement is 250 V single phase. AUM agree to provide this electrical power from their grids. IITM will do the necessary cabling and other arrangements. IITM shall pay the necessary charges for the consumption of electricity.
- 5.11 Necessary earthing points and lightning arresters exclusively for the radar are required. AUM and IITM will jointly establish this. IITM will pay the necessary charges for the earthing installation points.
- 5.12 AUM agrees to provide internet connection and IPs in the radar control room required to transfer the radar data to the central server at IITM. IITM will bear

the necessary expenses.

- 5.13 IITM ensures that no harm or damage to any property of AUM will be done.
- 5.14 Data generated from the X-band radar will be made available to AUM faculty for academic and research purposes and can involve with IITM in collaborative studies.
- 5.15 AUM shall authorize IITM to apply for a No Objection Certificate (NOC) for height clearance to the Airport Authority of India.
- 5.16 Safety and security for installation, operation, maintenance and uninstallation of X-band radar is the sole responsibility of IITM.
- 5.17 Scientists from IITM will be available for scientific collaborations in their concerned research areas, benefiting the AUM students and faculty of their specific interests.
- 5.18 No honorarium will be paid to the faculty members of both institutions involved in any scientific proposals, as they benefit academically.
- 5.19 The understanding and application of collected data through scientific investigations should be acknowledged by AUM in scientific publications, and for operational use, adequate credits should be provided.
- 5.20 IITM and AUM may also involve in joint research on the use of weather and climate information, development of instruments, etc., of use to the society, with further discussions between both institutions.
- 5.21 Interested students and faculty from both Institutions may be allowed to study the facility/ data/ application development and submit a report as part of their academic activity.

6.0 Responsibility of Each Party:

- 6.1 AUM will provide the space and other logistic supports (like electricity, internet etc.) required for the radar installation.
- 6.2 AUM may provide expertise in the area of electrical, electronics and instrumentation, mechanical, civil and computer engineering from various departments through their faculty collaboration.
- 6.2 IITM shall acknowledge AUM for the local support provided to establish

India's first urban radar network in Mumbai.

7.0 Coordinating Officials

Contact persons from both the institutions will be signatories below.

8.0 Confidentiality:

- 8.1 The data generated will remain the property of the Government of India (Ministry of Earth Sciences) and cannot be shared with any third party without having IITM consent on the disclosure.
- 8.2 Only Authorized persons from IITM should be conveying any information/digital information regarding the project to the media or press, which will be done only after necessary approval from Director, IITM.

9.0 Change In Scope of the MoU:

Any change in scope of work would be with mutual consent of both parties in writing.

10.0 Modifications to the MoU:

- 10.1 Any amendment or modifications of this MOU shall be in writing by both parties.
- 10.2 The modifications/changes shall be effective from the date on which they are made/ executed unless otherwise agreed to.

11.0 Force Majeure:

Neither party shall be held responsible for non-fulfillment of their respective obligation under this MoU due to circumstances beyond their control but not limited to war, flood, cyclones, riots, strikes etc. If such a condition continues beyond six months, the parties shall then mutually decide about the future course of action. Either party shall intimate each other of any such event.

12.0 Termination of the MoU:

AUM and IITM reserve rights to terminate MoU at any time with 30 day's notice.

13.0 Arbitration:

This is a project of the Government of India and property of the Government of India for operational use. In the event of any dispute or difference between the parties hereto, such disputes or differences shall be resolved amicably jointly by the Head of both institutions. Other modes of alternative dispute resolution like 'Mediation process' can also be initiated.

Jurisdiction: Mumbai/Pune shall be the jurisdiction.

In witness whereof, the parties hereto have signed this MOU on the date of **September 12, 2022.**



**Dr. Hira S. Vyas,
Registrar, AUM**



**Dr. R. Krishnan,
Director, IITM**

Witnesses:

1.



Dr. Shrikant Chavate.

3.



Dr. Satheesh A

2. **Dr. G. Pandithurai**

Sc-F & Project Director

4. **Dr. Subrata Kumar Das**

Scientist E