



Serial No:44077

Denomination: 100

Date 29-10-2016

Stamp S. no BW 623981

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 DIRECTOR (NARL)
 GADANKI

आन्ध्र प्रदेश ANDHRA PRADESH
 NATIONAL ATMOSPHERIC
 RESEARCH
 LABORATORY (NARL)
 GADANKI

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Memorandum of Agreement

(total eight A4 size pages including this page)

This Memorandum of Agreement is executed today on 29th october 2016 by and between

NATIONAL ATMOSPHERIC RESEARCH LABORATORY (NARL), Department of Space, Government of India through its Director namely Prof. A. Jayaraman having office at Gadanki Village (PO), Pakala Mandal, Chittoor District, Andhra Pradesh 517112, India, which expression shall include his successor/s in office (hereinafter referred to as the first party)

and

UNIVERSITY OF KASHMIR (UoK), recognized by the University Grants Commission of India and NAAC-A accredited, through its Registrar namely Prof. Musadiq A. Sahaf having office at Hazratbal, Srinagar, Jammu & Kashmir, 190006, India, which expression shall include his successor/s in office (hereinafter referred to as the second party)

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1. Preamble

- National Atmospheric Research Laboratory (NARL) at Gadanki near Tirupati in the Chittoor District of Andhra Pradesh is an autonomous research laboratory fully funded by the Department of Space (DOS), Govt. of India and involved in carrying out fundamental and applied researches in Atmospheric and Space Sciences. It had its humble beginning in 1992 as the National Mesosphere-Stratosphere-Troposphere (MST) Radar Facility (NMRF). Over the years several complementary techniques such as Raleigh/Mie lidars, wind profilers, other experimental facilities for measurements of atmospheric aerosols, trace gases and weather modeling systems have been added. NARL is administered by a Governing Council with Secretary, DOS as the Chairman and Director, NARL as the member Secretary. The Governing Council (GC) sets broad policy guidelines for NARL. A Scientific Advisory Committee (SAC) consisting of eminent scientists in the field of atmospheric sciences monitors the research activities and progress of NARL and provides future directions.
- The University of Jammu and Kashmir was founded in the year 1948. In the year 1969, it was bifurcated into two full-fledged Universities: University of Kashmir (UoK) at Srinagar and University of Jammu at Jammu. The University of Kashmir is situated at Hazratbal in Srinagar. Over the years, the University of Kashmir has expanded substantially. It has established satellite Campuses at Anantnag (South Campus) and Baramulla (North Campus) and three more satellite campuses at Kupwara, Kargil and Leh are being established to make higher education more accessible to people living in remote areas of Kashmir valley. The University has also established a sub office at Jammu to cater to the needs of the candidates enrolled with the University from outside Kashmir. Over the years, the University has marched towards excellence in its programs and activities. It has been re-accredited as Grade-A University by the National Assessment & Accreditation Council (NAAC) of India in the year 2011. This is a recognition and reflection of the high standard of quality in teaching and research at the University of Kashmir.
- NARL and UoK are individually referred to as 'Party' and collectively as 'Parties.'
- Whereas, NARL and UoK are interested in establishing collaborative research works in the field of atmospheric, ionospheric and space sciences;
- Whereas, the Parties are interested in setting up NARL observational facilities at places belonging to the University of Kashmir in Srinagar/Gulmarg and other parts of the Jammu & Kashmir state and also in creating a "Cell" for NARL observational facilities in the University of Kashmir, Srinagar.



- Herewith, the Parties agree for a cooperation aiming at measurement of Mesospheric and Thermospheric/Ionospheric (from about 75 to 300 km height region) air glows with airglow photometer/CCD imager at the wavelengths of mainly 557.7nm, 630nm, 840 nm and other ultraviolet, visible and near-infrared spectra at the UoK site in Srinagar, Jammu & Kashmir, India.
- The partners hereby agree as follows:

2. Objectives:

2.1 Establishing collaborative research works in the field of atmospheric, ionospheric and space sciences

Aim: To encourage the scientists of the National Atmospheric Research Laboratory (NARL), Gadanki and the University of Kashmir (UoK), Srinagar in conducting joint research works in various fields of atmospheric/ionospheric processes occurring in the whole height ranges from the boundary layer near the Earth's surface through the middle atmosphere and ionosphere to the magnetosphere and of other planetary atmospheres and their interaction with solar radiations.

2.2 Establishing NARL observational facilities at places belonging to the University of Kashmir in Srinagar/Gulmarg and other parts of the Jammu & Kashmir state

Aim: To facilitate the scientists of NARL and UoK to conduct joint research experiments/observations particularly over the Jammu and Kashmir region to enhance the understanding of the atmospheric dynamics associated with its peculiar climatic and weather conditions (western disturbances, cloud bursts, snow fall and avalanches, melting glaciers etc.) as well as large-scale thermospheric/ionospheric processes travelling through this region to low latitudes initiated over the polar regions due to Joule heating effects of direct impingement of solar high energy radiations and charged particles during solar and geomagnetic storm times.



2.3 Establishing NARL observational facilities cell in the University of Kashmir, Srinagar

Aim: Through this cell, as platform coordinated by NARL and UoK in terms of MoA, scientists of NARL and UoK can approach easily each other and discuss on various modalities of either conducting joint research work or installing observational instruments related to atmospheric/ionospheric studies in Jammu and Kashmir region.

3. Obligations of the Parties:



3.1 NARL

- shall provide the CCD imager and auxiliary hard- and softwares, which are under its possession to UoK on loan basis for a duration of up to three years for the purpose of measuring airglow intensities in the mesosphere and thermosphere/ionosphere region at the wavelengths of initially 557.7nm, 630nm and 840 nm and later at near infra-red and ultra-violet regions;
- provide software for the pre-processing of measured raw spectra and quantitative airglow intensity analysis from resulting calibrated spectra. This software is non-commercial (has been developed at Advanced Photonics, Mumbai through contract from NARL) and UoK is granted to use the software for non-commercial purposes;
- cover costs for shipping, installation & maintenance of the CCD imager in the UoK campus;
- for starting-up this activity, send an expert for the installation and to instruct UoK personnel in the operation of the imager and the analysis of measurements;
- be responsible for the maintenance of the imager. If any technical failure occurs, the standard procedure will be to temporarily ship the device back to either NARL or Advanced Photonics, Mumbai in consultation with NARL for repair;
- not be obliged to ship a replacement in case of permanent inoperability of the imager;
- test the instrumental performance and calibrate further devices of this kind acquired by UoK at a later time before the manufacturer delivers the imager to UoK.
- Provide training to the personnel at UoK for efficient handling and use of the instruments.

  T.K.R. T.K. Paul

3.2 UoK

- will perform regular measurements. It is aimed at performing minimum measurements at least ten days per month during night times (evening 8pm to next day morning 4am) around new moon days. UoK shall be exempted from performing regular measurements if weather conditions do not permit or factors beyond UoK's control;
- store the instrument at an appropriate location, avoiding exposition to rainfall and snowfalls as per the scientific advice of NARL.
- Provide space for housing the instruments (~1.5 m × 1.5 m × 3 m; length × breadth × height) preferably on a rooftop.
- keep an additional safe copy of measured data in an external hard disk drive at the site, which is stored in a different building than the primary dataset building
- UoK will forward all the raw data (recorded intensities and other basic parameters at all the wavelengths) as well as any log files electronically to NARL at least once in the first week of every month;
- UoK will not use the CCD imager and the generated data for commercial purposes, copy, disseminate or otherwise make accessible to third parties the auxiliary software provided by NARL.
- hold available trained personnel or eligible contract person for the operation of the imager;
- inform NARL in due time if any malfunction of the device is noted; NARL will decide whether a shipment back to NARL or Advanced Photonics, Mumbai is required;
- may not use the imager for purposes other than provided for in this Agreement;
- NARL and UoK will jointly identify a team of scientists for the project and smooth operation of the instrument. Members of the team will be offered co-authorship by

  T.K. Paul

default on publications resulting from this joint initiative and others will be considered based on their contribution;

- Make the data resulting from the analysis of recorded airglow intensities (for the wavelengths 557.7nm, 630nm and 840nm) available to the public three years after the measurements have been taken, with the prior written permission from NARL.

4. Other obligations

4.1 Dissemination of the CCD imager or analysis software by UoK to third parties is not allowed without explicit permission of NARL. UoK will not be obliged to buy imager during or after the period of this agreement.

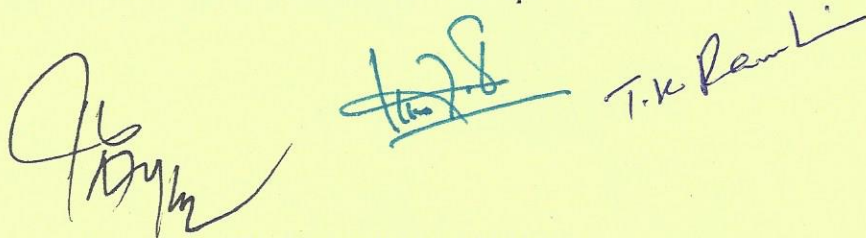
4.2 The ownership of NARL on the CCD imager instrument shall not be affected by its temporary installation / provision to UoK for the purposes under this MoA

4.3 UoK will strive its best for safety of the instrument, however, it will not be held responsible for any damages to the imager for reasons beyond its control such as damages during shipping, lightning, war, rainfall, snowfall etc. In case of instrumental damage caused by UoK by gross negligence or intent, its liability is restricted to the assigned value of the imager (Rupees seventy five Lakhs). In such case, NARL will provide the purchase details of the imager for the evaluation of the actual cost of the imager.

4. As a collaborative atmospheric research project, NARL and UoK together may generate various other joint research proposals for funding in the field of atmospheric/space sciences from DOS/ISRO. In this regard, the UoK shall follow the guidelines of Department of Space for supporting the Sponsored Research projects under its RESPOND Programme.

5. **Principal Investigators (PIs):**

Dr. T. K. Ramkumar (Scientist/Engineer -SF, NARL) and Professor Manzoor A. Malik (Dept. of Physics, University of Kashmir, Srinagar) will be the joint Principal Investigators of the project and are responsible for coordinating the joint research works at the Kashmir University.



The image shows three handwritten signatures in blue ink. The first signature on the left is a stylized cursive signature. The second signature in the middle is a more legible signature with a horizontal line underneath. The third signature on the right is a cursive signature that appears to read 'T.K. Ramkumar'.

6. Intellectual property rights/confidentialities

As the final outcome of scientific results is due to the efforts of joint collaboration between NARL and UoK, the results should not be made available to the public, scientific publishers without prior permission of the other party. When the results in the form of manuscripts are sent for any kind of publications, prior mutual consent of all the authors, co-authors, principal investigators needs to be obtained in writing. Further, until the results are published in properly indexed journals, the content of the manuscripts should not be disclosed in any form to anybody for whatsoever reasons. However, with prior permission of both the parties, deputed scientists involving in analyzing the data can discuss and take help of their colleague scientists in NARL and UoK for various research methodologies, scientific interpretations without affecting the secrecy of important findings.

7. Entry into force/Duration/Termination

7.1 This Agreement shall come into force with effect from *29th October 2016* upon the signatures of both parties and shall be effective until 31.12.2019.

7.2 The Parties may extend the cooperation beyond this period by mutual written consent.

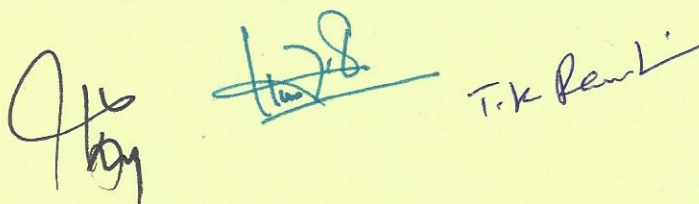
7.3 Both the parties shall have the right to terminate this Agreement at any time by issuing advance notice of three months to the other party on this agreement.

7.4 During the notice period both the parties shall strive to settle amicably the financial and any other technical issues.

7.5 Upon termination of this Agreement, the imager will be shipped back to NARL within four weeks and the cost of shipping will be borne by the party who initiates the early termination. NARL will cover the costs for shipping the imager back after regular termination of this cooperation agreement or in case of a termination strived for by both parties.

8. Amendments of MoA

If any amendments are needed to be done to the MoA in the future, the interesting party can put forth them to the other party well in advance of minimum three months with draft amendments/suggestions. After mutual agreements between NARL and UoK, the MoA can be amended without breaching the norms of intellectual property rights and the confidentialities as mentioned in the para 6 of this MoA and other basic rights of these two parties (NARL, UoK) and the Principal investigators of the present MoA.

The image shows three handwritten signatures in blue ink. The first signature on the left is stylized and appears to be 'J. K. ...'. The middle signature is more legible, possibly 'T. K. ...'. The signature on the right is clearly 'T. K. Pauli'.

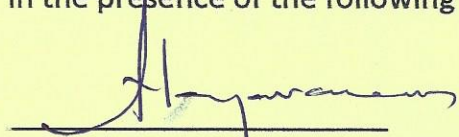
9. Financial

Apart from the above agreements that include some financial aspects, which can be handled by NARL and UoK independently on their own as per their respective commitments, no other explicit financial commitments or obligations by them are referred here.

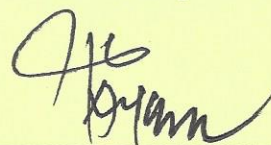
10. Arbitration

If any dispute arises between the parties relating to any aspect of this agreement, the same shall be referred to Dr. T. K. Ramkumar, Scientist/Engineer-SF, NARL, Gadanki and Prof. Manzoor Ahmad Malik, Dept. of Physics, Kashmir University and they are authorised to nominate one Arbitrator each (with the approval of Head of their respective institutes). In case of disagreement of the two arbitrators as to the disposal of any referred dispute, the two arbitrators as appointed in accordance with the aforementioned procedure shall appoint a third arbitrator who shall act as an umpire and the matter in dispute shall be decided accordingly by majority. It is mutually agreed that for Jurisdiction either one of these four places in order of preference can be considered: (1) Tirupati (2) Chennai (3) Srinagar and (4) New Delhi.

In witness whereof the parties here to have set and subscribed their hands and signatures to this Memorandum of Agreement on this day of *29th October* 2016 in the presence of the following witnesses.

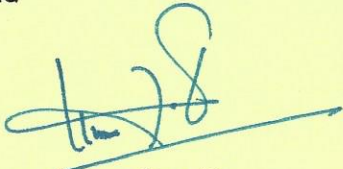
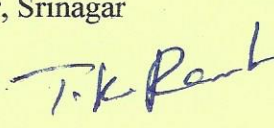


Prof. A. Jayaraman,
Director, National Atmospheric Research Laboratory,
Gadanki, AP, India



Prof. Musadiq A. Sahaf,
Registrar
University of Kashmir,
Srinagar, India

Witnesses:

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1. Prof. Manzoor Ahmad Malik
Head, Dept. of Physics
University of Kashmir, Srinagar
 2. Dr. T. K. Ramkumar 
Scientist/Engineer-SF
National Atmospheric Research Laboratory
Gadanki, Tirupathi