


Brief Biodata

Name: Dr. Arun Kumar Upadhayaya

Designation:	Sr. Principal Scientist	
DP No. and Name:	3.1, Atmospheric Science & Metrology	
DU No. and Name:	3.0, Environmental Sciences & Biomedical Metrology	
Email:	upadhayayaak@nplindia.org	
Date of Joining CSIR-NPL:	03.12.2007	
Phone (office)	01145608241	
Mobile (optional)	-	

Research Area/ Interest

Upper Atmospheric Physics, Space weather, Space Climate, Planetary Ionosphere, Coupling of atmospheres.

Educational Qualifications

(Please write latest qualification first)

Degree	Subject	University/ Institute	Year
PhD	Physics(Upper Atmosphere)	IIT Roorkee	2005
M.Phil	Physics (Instrumentation)	IIT Roorkee	1999

Academic / Research Experience

Grade / Post	Institute	Duration		Research Field
		From	To	
Gr1V(2)/Scientist	National Physical Laboratory	3.12.2007	2.12.2011	<i>Upper Atmospheric Physics.</i>
Gr1V(3)/Sr. Scientist	National Physical Laboratory	3.12.2011	2.12.2015	
Gr1V(4)/Pr. Scientist	National Physical Laboratory	3.12.2015	2.12.2020	
Gr1V(5)/Sr. Pr. Scientist	National Physical Laboratory	3.12.2021	Till day	

No. of Publications

No. of Publications in SCI Journals	No. of Publications in non-SCI Journals	No. of Publications in Conference Proceedings	Books	Total
25	01	32	01	59

Selected Publications(Recent)

1. Gupta, S., Upadhayaya, A. K., & Siingh, D. (2021). Ionospheric response to sudden stratospheric warming events across longitudes during solar cycle 24. *Journal of Geophysical Research: Space Physics*, 126, e2021JA029206. <https://doi.org/10.1029/2021JA029206>
2. Gupta, S., & Upadhayaya, A. K. (2019). Morphology of Martian low-altitude ionospheric layer: MGS observations. *Journal of Geophysical Research: Space Physics*, 124. <https://doi.org/10.1029/2018JA026162>.
3. Upadhayaya, A. K., & Gupta, S. (2018). Longitudinal characteristics of Martian electron density profiles: MGS observations. *Journal of Geophysical Research: Space Physics*, 123. <https://doi.org/10.1029/2018JA025715>.
4. Gupta, S., and A. K. Upadhayaya (2017), Preearthquake anomalous ionospheric signatures observed at low-mid latitude Indian station, Delhi, during the year 2015 to early 2016: Preliminary results, *J. Geophys. Res. Space Physics*, 122, doi:10.1002/2017JA024192.
5. Gupta, S., and A. K. Upadhayaya (2017), Morphology of ionospheric F2 region variability associated with sudden stratospheric warmings, *J. Geophys. Res. Space Physics*, 122, doi: 10.1002/2017JA024059.
6. Upadhayaya, A. K., S. Gupta, and P. S. Brahmanandam (2016), F2 region response to geomagnetic disturbances across Indian latitudes: O(1 S) dayglow emission, *J. Geophys. Res. Space Physics*, 121, 2595-2620, doi: 10.1002/2015JA021366.
7. Upadhayaya, A. K., and K. K. Mahajan (2013), Ionospheric F2 region: Variability and sudden stratospheric warmings, *J. Geophys. Res. Space Physics*, 118, 6736–6750, doi:10.1002/jgra.50570.
8. Mahajan, K. K., N. K. Lodhi, and A. K. Upadhayaya (2010), Observations of X-ray and EUV fluxes during X-class solar flares and response of upper ionosphere, *J. Geophys. Res.*, 115, A12330, doi: 10.1029/2010JA015576.

Patents

Nil.

Current Activities

(Not more than 100 words)

The research work I am currently involved in can be broadly classified under two objectives:

Issue: Indian region covers a wide extent from equatorial ($8^{\circ}4'N$ to $68^{\circ}7'E$) to low mid-latitude ($37^{\circ}6'N$ to $97^{\circ}25'E$), and the dynamics are affected by the location as physics of Ionosphere is controlled by the magnetic field. So existing models either over/ under estimate the real-time critical parameters to be used for HF communication which is a backup way of safe communication and navigation (Military and Aviation) across a wide range of thousands of kilometres.

Work Done: Apart from doing Source apportionment, we have examined the efficacy and hence quantified the ionospheric variability caused by the sources. As the ionosphere is produced by solar ionization only, it was believed; the variability is doomed to be because of the solar source. However, in our research work, we have shown that the variability of ionosphere can also be because of lower atmospheric and tectonic processes. To surprise, it was found that the variability imparted to ionosphere because of the lower atmospheric and tectonic processes are comparable to that produced by the solar source. This is a significant result as the existing models to date do not include these sources to determine the ionospheric variability. We are advocating that these sources should be included in the models. The results were published in form of nine papers in high impact journals.

Sponsored project Undertaken as PI to achieve the objective :

(a) To explore the potential application of infrasonic supported by Ionosonde, GPS and SODAR for earthquake precursor studies (**Sponsored by Ministry of Earth Sciences (MoES) (2014-2018)**).

(b) Atmospheric Investigation using a network of Indian Regional Navigation Satellite System (IRNSS) externally supported **SAC-ISRO Department of Space (2016-2021)**.

(B) To examine Ionospheric variability at Terrestrial Planets (Mars and Venus)

Issue: On the Earth, solar wind conveys its effects through a sphere of magnetic lines enveloping the Earth, called the magnetosphere. On a non-magnetic planets like Venus and Mars interact directly with these planets neutral and plasma environment. So, the critical question is how Ionosphere if exist in these planets, behave in the absence of an intrinsic magnetic field? Studying Ionosphere on other planets provides an ideal lab (scenario) to understand and do a comparative analysis as of as at Earth.

Work Done: An analysis of longitudinal characteristics of 5,600 electron density profiles returned from the Mars Global Surveyor's Radio Science experiment is carried and we found that the peak altitude of the photochemical F1 layer (hmF1) exhibits a large degree of longitudinal variability which is not seen in Earth's ionosphere. Further, we found that the Metallic layer occurrence does not support solar X-ray origin as a causative mechanism for this occurrence of the M layer. These results were published in the form of two papers in high impact journal.

Honour(s)/Award(s)/ Fellowship(s)

Awards/ Recognition:

(a) **International:** Ms. Sumedha Gupta Ph.D. from CSIR-NPL under my supervision was conferred with the Young Scientist Award of the **International Union of Radio Science (URSI) for XXXIII General Assembly and Scientific Symposium** held at Rome from 29 August to 5 September 2020. She presented the paper entitled "Sources of Ionospheric F2 region variability at low-mid latitude station, Delhi" by Sumedha Gupta and A.K Upadhyaya.

(b) **National:** Paper entitled “Mars Global Surveyor electron density profiles: longitudinal Characteristics by A.K Upadhayaya & Sumedha Gupta presented at **20th National Space Science Symposium (NSSS -2019)** hosted by Savitribai Phule Pune University with Co-hosts Inter-University Centre for Astronomy and Astrophysics(IUCAA) and national centre for Radio Astrophysics (NCRA), Pune during 29-31 January 2019 has been given the **best paper award**.

Contributions to AcSIR

Nil.

Membership of Professional Societies/ Institutions

(a) **International Scientific organizing committee member & Invited speaker** for AOSWA Workshop /conferences held in Indonesia, Thailand, China, Japan and Korea from 2015 to 2019.(b) **International Technical Committee member** for International Reference Ionosphere 2015 Workshop, 2-13 November 2015,King Mongkut’s Institute of Technology Ladkrabang Bangkok, Thailand. (c) Invited as an expert for brainstorming on the theme “**Ionosphere-Thermosphere-Magnetosphere Physics**” on August 13-14, 2019, at Space Physics Laboratory, VSSC (ISRO). The meeting aimed to brainstorm and possibly identify potential science questions and evolve a program/mechanism to steer the research in India in view of the current global trends and future directions.(d) Invited as **Lecturer in COSPAR Capacity Building Workshop** entitled “Coronal and Interplanetary Shocks: Analysis of Data from Space and Ground- based Instruments” during Jan 6-17, 2020 at Kodaikanal Solar Observatory, Indian Institute of Astrophysics (e) Member of **Transmitting Equipment for Radio Communications Sectional Committee, LTD 12** of Bureau of Indian Standards (BIS), India since 2018. (f) Invited as an **expert in a bilateral meeting for Strengthening Technology and Capacity Building Linkages with Belarus and CIS countries** to deliver a talk on “Radio Science Activities at CSIR-NPL” on February 17, 2021. (g) Efforts were made in strategic sector, and I was actively involved in discussion meetings for “**Ionospheric modeling for OTH Radar application**” with DRDO-LRDE(Electronics & Radar Development Establishment). (h) Assisted in preparing a **high-frequency simulator and frequency planner** for the Indian Army to Military College of Telecommunication Engineering Mhow(Indore). (i) I am Scientific In-charge from India looking after the **Regional Warning Centre (RWC-India)** which is part of the International Space Environment Service (ISES), a chain of twenty member countries and Asia Oceania Space Weather Alliance (**AOSWA**) for Space weather Services.

Any other Information

(Not more than 100 words)

1. I am serving as Vice President (elected) of NPL–Club; the club responsible for Organizing various sports, cultural activities in the laboratory.
2. I am serving as Vice-President of Resident’s Welfare Association of CSIR-NPL Colony.
3. I am a member Representative from Environmental Sciences and Biomedical Metrology Division (DU#03) for Science Communication and Information Dissemination Committee.
4. I am Scientist in-charge (member) from the Environmental Sciences and Biomedical Metrology Division for compilation of Annual report for the year of 2018-19 and 2019-20.
5. I am serving as a member of Disaster Management Committee responsible for Planning, Coordinating and implementing measures for the management of any disaster in the laboratory.
6. Representative of Table Tennis team from NPL in SSBMT tournaments and was Winner in the event during March 3-5, 2017 organized in Lucknow.