Keshav Ram Tripathi

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Research Interest

- To use radio science technique for studying the atmosphere and ionosphere of solar system objects. Developement of robust algorithm for profiling the planetary atmosphere from the raw data obtained in Radio Occultation (RO) experiments.
- To study the interaction of ionosphere with the outer space.

Profile

- Nationality : Indian
- Language: Hindi (native), English (fluent)
- National Exam: IIT-JAM-2013, CSIR-NET-2015.
- Fellowship: ISRO research fellowship (5 Year, 2018- present).
- Final year PhD candidate in planetary science division.
- Studying the characteristic feature of the Venus, and lunar ionosphere.

Education

2018/03–present PhD in planetary ionosphere
Space Physics Laboratory, VSSC, ISRO Trivandrum, India

- **"A comparative study on the ionospheric variability in the unmagnetized planetary systems using Radio Occultation (RO) technique".**
  - Developed the algorithm to analyse the raw data (signal processing), obtained from radio occultation experiments over planetary bodies (Venus, Mars, and Moon).
  - Developed a retrieval algorithm to obtain the profile of atmospheric parameters.
  - Explored the ionospheric variability in the planetary ionosphere (Venus, and Moon).

2013/07–2015/06 M.Sc. in Physics
University of Allahabad Allahabad, India

- Specialization: Non Linear Optics (NLO)
- M.Sc. Project: Standard Quantum Teleportation (theoretical)

2010/07–2013/06 B.Sc. in Physics, Math
University of Allahabad Allahabad, India

- Subjects: Math, Physics, and Computer Science

Work Experience

2015/07–2016/12 Campus Associate
Azim Premji Foundation Uttarkashi, Uttarakhand, India

- Work on padagogy of basic science with basic school teachers (1-8, standards)
- Involved in the development of teacher learning material (TLM) on basic physics concepts

2018/07–present Software Development
Space Physics Laboratory, VSSC, ISRO Trivandrum, India

» Developed the software for quick look display for DFRS payload, onboard Chandrayaan-2 spacecraft. Which demonstrate the real time health of the received radio signal.
» Analysis of complete Radio Occultation data set, experiments conducted by DFRS payload and help to archive the data over PRADAN website for public use.
» Prediction of occultation events for upcoming ISRO's planetary missions.

PROFESSIONAL EXPERIENCE

2018/07–present (a) Technical: Radio Occultation technique

Space Physics Laboratory, VSSC, ISRO Trivandrum, India

» The primary objective of my thesis has been to develop an algorithm to precisely estimate the phase change in radio signal due to the target medium and derive the atmospheric parameters, namely the electron density of the ionosphere and temperature, pressure, and neutral density profiles of the lower atmosphere. The software is developed for one-way downlink bi-static single-frequency RO experiments. The software has two components, (a) the precise determination of phase changes in the radio signals, and (b) the retrieval of atmospheric parameters.
» Developed an algorithm to retrieve line-of-sight total electron content (TEC) in the Lunar ionosphere. Radio occultation measurements for Lunar the ionosphere were conducted using dual-frequency radio science (DFRS) payload onboard the Chandrayaan-2 orbiter. The experiments were conducted using two coherent X, and S-band radio signals in one-way downlink bi-static mode, and the signal was received at IDSN, India.
» In addition to the RO work, I have actively participated in the Indian Space Weather Impact Monitoring (InSWIM) program as well. I Installed GPS receivers at various InSWIM stations, developed codes to convert slant TEC (STEC) to vertical TEC, and calculate the S4 scintillation index. Used GPS receiver data from Bengaluru station (close to IDSN, antennas) to estimate the effect of the terrestrial ionosphere on the radio signal used for RO measurements.

2021/07–present (a) Scientific: Planetary ionosphere

Space Physics Laboratory, VSSC, ISRO Trivandrum, India

» Venus ionosphere:
  » Characteristic features of different layers of the Venus ionosphere using Akatsuki radio science payload.
  » Understanding of the enhancement in electron density in the Venusian ionosphere below the V_2 layer peak at $\sim$ 142 km (V_0, and V_1 layers)
  » Effect of the forcing from the lower atmosphere on the structure and shape of the V_0 layers is also being explored.
  » Exploring the effect of the solar activity on the formation of the V_0 layer.

» Lunar ionosphere:
  » Characteristic feature of the lunar ionosphere using DFRS payload onboard Chandrayaan-2 orbiter.
  » Studied the least explored lunar wake region.
  » Simulated the lunar ionosphere in the lunar wake region using 3D lunar ionospheric model (3D-LIM).
  » Worked on the charging of the Lunar surface in the sunlit condition for the different compositions of the Lunar regolith using a semi-classical approach and estimated the surface potential.

IT Skills

» IDL, gFORTRAN, SPICE- toolkit, GNUPLOT, C.

Publications

» Kureshi, R., Tripathi, K. R., & Mishra, S. K. (2020). Electrostatic charging of the sunlit hemisphere of the Moon under different plasma conditions. **Astrophysics and Space Science, 365(2), 1-13.**

» Tripathi, K.R., Choudhary, R.K., Ambili, K.M., Imamura, T. and Ando, H., 2022. Characteristic Features of V0 Layer in the Venus Ionosphere as Observed by the Akatsuki Orbiter: Evidence for Its Presence During the Local Noon and Post-Sunset Conditions. **Geophysical Research Letters, 49(7), p.e2022GL097824.**

» Keshav R Tripathi, R K Choudhary, K M Ambili, K R Bindu, R Manikantan, Umang Parikh, A study on the characteristic features of the lunar ionosphere using dual frequency radio science (DFRS) experiment onboard Chandrayaan-2 orbiter, **Monthly Notices of the Royal Astronomical Society: Letters,** Volume 515, Issue 1, September 2022, Pages L61–L66, https://doi.org/10.1093/mnrasl/slac058

» Tripathi, K.R. and Choudhary, R.K., 2022. Quantification of errors in the planetary atmospheric profiles derived from radio occultation measurements. **Earth and Space Science, 9(6), p.e2022EA002326.**

» Keshav R. Tripathi, R K Choudhary, Lakshmi Jayalal, On the estimation of frequency residuals in a radio occultation experiment, **Monthly Notices of the Royal Astronomical Society,** Volume 517, Issue 1, November 2022, Pages 776–786, ttps://doi.org/10.1093/mnras/stac2653

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» K M Ambili, Keshav R. Tripathi, R K Choudhary, T Imamura, On the origin and characteristic features of the V1 layer in Venus ionosphere using Akatsuki radio science experiment and the one-dimensional photochemical model, **Monthly Notices of the Royal Astronomical Society,** 2022;, stac2624, https://doi.org/10.1093/mnras/stac2624.

» Keshav R. Tripathi, KM Ambili, R.K. Choudhary, and T. Imamura. Venusian ionosphere during deep solar minima: Some new insights using Akatsuki radio science experiment. **under review, JGR, Planet**.

» KM Ambili, Keshav R. Tripathi, R.K. Choudhary, and T. Imamura. Some new insights into the characteristic features of the V_2 layer in the Venus ionosphere using one-dimensional photochemical model and VeRa observations. **under review, ICARUS**.

» Keshav R. Tripathi, R. K. Choudhary, Jeslin S. Jose, KM Ambili, and T. Imamura. Gravity wave modulations at the lower altitudes of Venus ionosphere. **under review, GRL**

» KM Ambili, Keshav R. Tripathi, R. K. Choudhary, and T. Imamura. Investigations on the origin of V_0 layer using radio occultation measurements and 1D-PCM calculation.**under preperation.**

Conferences

» Presented a paper entitled "Formation of V_0 layer in the Venusian ionosphere" Keshav R. Tripathi, K.M. Ambili, R.K. Choudhary, and Ajay Potdar" in the **3rd Eddy Cross Disciplinary Symposium held at Vail Colorado, USA during 6-10 June, 2022.**

» Presented a poster in virtual mode on "Characteristic features of V_0 layer in the Venus ionosphere as observed by the Akatsuki orbiter: evidence for its presence near the equator and under post-sunset conditions". Keshav R. Tripathi, R.K. Choudhary, KM. Ambili, T. Imamura, and H. Ando. **AGU fall meetings-2021, held during 13-17 December, 2021 at New Norcia, USA.**

- Presented an **invited talk** entitled " Characteristic features of V0 layer in the Venus ionosphere observed by Akatsuki orbiter ". Keshav R. Tripathi, R.K. Choudhary, KM. Ambili, T. Imamura, and H. Ando in **Akatsuki SWT #19 workshop, Japan, held on 18-19 October 2021.**
- Presented a paper on " V0 layer in the Venus ionosphere: is it of meteoric origin?. Keshav R. Tripathi, R. K. Choudhary, KM Ambili, T. Imamura, and H. Ando at " **MetMess-2021. During 29-30 November 2021, Physical Research Laboratory, Ahmedabad, INDIA. "**
- Presented an paper entitled " A study on the characteristic features of the V0 layer in the Venus ionosphere using measurements from the Radio Science experiment onboard Akatsuki orbiter. Keshav R. Tripathi, R. K. Choudhary, KM Ambili, T. Imamura, and H. Ando at "**Venus Science Conference 2021 (Venus-SC-2021). During 23-24 September 2021, Physical Research Laboratory, Ahmedabad, INDIA. "**
- Quantitative Assessment of Error in RO profiling, Keshav R. Tripathi, R.K. Choudhary. Oral presentation at **Indian Planetary Science Conference,PRL, India, 25-26 February 2021 (IPSC-2021).**
- Variations in the peak electron density of the Venus ionosphere : some new insights using Akatsuki Radio Science measurements, Keshav R. Tripathi, K.M Ambili, R.K. Choudhary, T. Imamura, and H. Ando. Oral presentation at **Venus Exploration and Analysis Group (VEXAG), NASA,16-17 November, 2020.**
- Quantitative Assessment of Error in RO profiling, Keshav R. Tripathi, R.K. Choudhary. Oral presentation at **Indian Planetary Science Conference, PRL, India, 25-26 February 2021 (IPSC-2021).**
- An **invited talk** on "Venusian ionosphere during deep solar minima: A study using Akatsuki radio science experiment". **Keshav R. Tripathi**, R.K. Choudhary, KM. Ambili, and T. Imamura., in National Venus Science Conference (Venus-SC-2022) held virtually during September 29-30, 2022 at Physical Research Laboratory, Ahmedabad, INDIA.

Awards

- **Best paper presentation awards**, "Characteristic features of V_0 layer in the Venus ionosphere. 1st National Venus Science Conference (Venus-SC-2021) held virtually during September 23-24, 2021 at Physical Research Laboratory, Ahmedabad, INDIA."
- Received Jack Eddy travel grant to participate in "3rd Eddy Cross Disciplinary Symposium held at Vail Colorado, USA during 6-10 June, 2022."

Summer School

- Summer training school on " Planetary Sciences and Exploration", physical research laboratory (PRL), Ahemdabad, India. During 2 May to 31 June 2019.

Scientific Campaign

- Campaign to observe earth ionospheric variability during total solar eclipse events in 26 December 2019. We have install the GPS along the path of eclipse at radio astronomy center (RAC), Ooty, India for 0ne week and observe TEC variation of the Ionosphere.

Supervisor

Dr. Raj Kumar Choudhary Sci/ Eng. (SG)

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