

Keshav Aggarwal

Space physics & planetary science

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Education

2023 – 2026	Ph.D. in Astronomy (thesis submitted May 2026) Department of Astronomy, Astrophysics and Space Engineering, Indian Institute of Technology Indore - Thesis: <i>Exploring space weather and its effect on planetary atmospheres using radio occultation</i> - Supervisor: Prof. Abhirup Datta
2021 – 2023	M.Sc. in Astronomy Indian Institute of Technology Indore
2021	B.Sc. in Physics, Chemistry and Mathematics Chaudhary Charan Singh University, Meerut

Research positions

2026	Student Visitor Space Physics Laboratory, Vikram Sarabhai Space Centre (ISRO), Thiruvananthapuram
2023 – 2026	Prime Minister’s Research Fellow DAASE, IIT Indore. Radio occultation studies of the solar wind, the interplanetary medium and the lunar plasma environment.
2022	Member, JWST Transiting Exoplanet Community Early Release Science Team Co-author on nine papers on WASP-39b, WASP-18b and WASP-43b.

Fellowships and awards

Dec 2025	AGU Student Grant American Geophysical Union, for a poster at the AGU Fall Meeting 2025
Mar 2025	Early Career Researcher Award, best poster 6th Indian Planetary Science Conference, IIT Roorkee
Oct 2023	Prime Minister’s Research Fellowship (PMRF) Ministry of Education, Government of India

Industry experience

Aug 2022 – Feb 2023	Researcher, AI/ML and Orbital Mechanics ERETS Space, London. Project head: Dr. Abhiram Jayan Nair. Member of the AI/ML team; built data processing pipelines.
Feb 2022 – Aug 2022	Data Analyst and Management Intern Armstrong Space, Australia. Project head: Abin Sharaf. Data analysis; managed a team of interns.

Publications

First-author journal papers

- Aggarwal, K.**, Choudhary, R. K., Datta, A., Banerjee, S., Manikantan, R., Sharma, A., Imamura, T. (2026). A study on the contribution of the interplanetary medium in radio occultation experiments. *Icarus*. doi:10.1016/j.icarus.2026.117291
- Aggarwal, K.**, Choudhary, R. K., Datta, A., Sharma, A. (2026). Plasma turbulence in the lunar environment across solar wind and magnetotail conditions: Observations from Chandrayaan-2 Radio Science experiment. *Journal of Geophysical Research: Planets*. doi:10.1029/2026JE009957
- Aggarwal, K.**, Choudhary, R. K., Datta, A., Banerjee, S., Imamura, T., Ando, H. (2026). A turbulence index independent framework for deriving solar wind speed and coronal electron density from radio spectral broadening. *Monthly Notices of the Royal Astronomical Society*. doi:10.1093/mnras/stag554

4. **Aggarwal, K.**, Choudhary, R. K., Datta, A., Roopa, M. V., Imamura, T. (2026). A generalized method for estimating solar wind speeds and densities using spectral broadening for a Kolmogorov turbulence spectrum. *Advances in Space Research*. doi:10.1016/j.asr.2026.03.059

5. **Aggarwal, K.**, Choudhary, R. K., Datta, A., Imamura, T. (2025). On the estimation of solar wind velocity under varying solar activity conditions using Akatsuki measurements. *Monthly Notices of the Royal Astronomical Society*. doi:10.1093/mnras/staf1305

6. **Aggarwal, K.**, Choudhary, R. K., Datta, A., Roopa, M. V., Dai, B. K. (2025). Insights into solar wind flow speeds from the coronal radio occultation experiment: Findings from the Indian Mars Orbiter Mission. *The Astrophysical Journal*. doi:10.3847/1538-4357/adb627

1. Carter, A. L., May, E. M., Espinoza, N., Welbanks, L., et al. (incl. **Aggarwal, K.**) (2024). A benchmark JWST near-infrared spectrum for the exoplanet WASP-39 b. *Nature Astronomy*. doi:10.1038/s41550-024-02292-x

2. Bell, T. J., Crouzet, N., Cubillos, P., Kreidberg, L., Piette, A. A. A., et al. (incl. **Aggarwal, K.**) (2024). Nightside clouds and disequilibrium chemistry on the hot Jupiter WASP-43b. *Nature Astronomy*. doi:10.1038/s41550-024-02230-x

3. Powell, D., Feinstein, A., Lee, E., Zhang, M., Tsai, S., Taylor, J., et al. (incl. **Aggarwal, K.**) (2024). Sulphur dioxide in the mid-infrared transmission spectrum of WASP-39b. *Nature*. doi:10.1038/s41586-024-07040-9

4. Tsai, S., Lee, E., Powell, D., Gao, P., Zhang, X., Moses, J., et al. (incl. **Aggarwal, K.**) (2023). Photochemically produced SO₂ in the atmosphere of WASP-39b. *Nature*. doi:10.1038/s41586-023-05902-2

5. Grant, D., Lothringer, J. D., Wakeford, H. R., et al. (incl. **Aggarwal, K.**) (2023). Detection of carbon monoxide's 4.6 micron fundamental band structure in WASP-39b's atmosphere with JWST NIRSpec G395H. *The Astrophysical Journal Letters*. doi:10.3847/2041-8213/acd544

6. Coulombe, L.-P., Benneke, B., Challener, R., Piette, A., Wiser, L., Mansfield, M., et al. (incl. **Aggarwal, K.**) (2023). A broadband thermal emission spectrum of the ultra-hot Jupiter WASP-18b. *Nature*. doi:10.1038/s41586-023-06230-1

7. JWST Transiting Exoplanet Community Early Release Science Team: Ahrer, E., Alderson, L., Batalha, N., Bean, J., et al. (incl. **Aggarwal, K.**) (2023). Identification of carbon dioxide in an exoplanet atmosphere. *Nature*. doi:10.1038/s41586-022-05269-w

8. Rustamkulov, Z., Sing, D., Mukherjee, S., May, E., Kirk, J., Schlawin, E., et al. (incl. **Aggarwal, K.**) (2023). Early Release Science of the exoplanet WASP-39b with JWST NIRSpec PRISM. *Nature*. doi:10.1038/s41586-022-05677-y

9. Alderson, L., Wakeford, H., Alam, M., Batalha, N., Lothringer, J., Redai, J., et al. (incl. **Aggarwal, K.**) (2023). Early Release Science of the exoplanet WASP-39b with JWST NIRSpec G395H. *Nature*. doi:10.1038/s41586-022-05591-3

Conference proceedings and book chapters

1. Zhang, P., Morgan, J., Oberoi, D., Strauss, D. T., Luo, Y., Kontar, E., Huang, Z., **Aggarwal, K.**, Kumari, A., Datta, A., Morosan, D. E., Botha, G. J. J. (2026). Probing the solar corona and the solar wind using angular broadening observations with the SKA. *Advancing Astrophysics: Preparing for Science with the SKAO*. arxiv.org/abs/2603.25421

2. **Aggarwal, K.**, Datta, A., Choudhary, R. K. (2025). Studying the ‘Smiley Sun’ using the Akatsuki radio occultation experiment. *Proceedings of the 7th URSI Asia-Pacific Radio Science Conference (AP-RASC 2025)*. doi:10.46620/ursiaprasc25/ahct9245

3. **Aggarwal, K.**, Choudhary, R. K., Datta, A. (2024). Results from radio occultation studies using Indian Mars Orbiter Mission. *Proceedings of the 6th URSI Regional Conference on Radio Science (RCRS 2024)*. doi:10.46620/ursi_rsrc24/1017qon9346

4. Deep, A., Datta, A., Brawar, B., **Aggarwal, K.** (2025). Dynamics of Earth's magnetopause during solar storms: insights from in-situ measurements of NASA's MMS mission. *Proceedings of the 7th URSI Asia-Pacific Radio Science Conference (AP-RASC 2025)*. doi:10.46620/ursiaprasc25/qzpe5277

5. Shekhar, K. S., Tanti, H. A., Datta, A., **Aggarwal, K.** (2023). Monitoring infrastructure faults with YOLOv5, assisting safety inspectors. *2023 International Conference on Integration of Computational Intelligent System (ICICIS), IEEE*. doi:10.1109/ICICIS56802.2023.10430270

White papers and preprints

1. Seaton, D., Caspi, A., Casini, R., Downs, C., Gibson, S., Gilbert, H., et al. (incl. **Aggarwal, K.**) (2023). Improving multi-dimensional data formats, access, and assimilation tools for the twenty-first century. *Bulletin of the AAS 55(3), Heliophysics 2024 Decadal Survey white paper*. baas.aas.org/pub/2023n3i361

2. Caspi, A., Seaton, D., Casini, R., Downs, C., Gibson, S., Gilbert, H., et al. (incl. **Aggarwal, K.**) (2023). COMPLETE: a flagship mission for complete understanding of 3D coronal magnetic energy release. *Bulletin of the AAS 55(3), Heliophysics 2024 Decadal Survey white paper*. baas.aas.org/pub/2023n3i048

3. Caspi, A., Seaton, D., Casini, R., Downs, C., Gibson, S., Gilbert, H., et al. (incl. **Aggarwal, K.**) (2023). Magnetic energy powers the corona: how we can understand its 3D storage & release. *Bulletin of the AAS 55(3), Heliophysics 2024 Decadal Survey white paper*. baas.aas.org/pub/2023n3i049

4. Russell, A. J. B., **Aggarwal, K.**, Rueda, J. A. A., Allanson, O., Baker, D., Bate, W., et al. (2025). UK white paper on magnetic reconnection. *arXiv preprint*. arxiv.org/abs/2512.11631

Under review

1. Choudhary, R. K., **Aggarwal, K.**, Potdar, A. (2026). Long-term GNSS loss-of-lock across the Indian equatorial ionization anomaly. *GPS Solutions*. #

2. Choudhary, R. K., Potdar, A., **Aggarwal, K.** (2026). High-spatial and temporal 3D imaging of the ionosphere: a GAGAN-based virtual receiver approach. *Journal of Geophysical Research: Space Weather*. #

3. Deep, A., Datta, A., **Aggarwal, K.**, Brawar, B. (2026). Earth's magnetopause response during the Mother's Day storm based on multi-satellite data. *Solar Physics*. #

Talks and posters

23–25 Mar 2026	7th Indian Planetary Science Conference (IPSC 2026) IIT Indore, India TALK <i>A turbulence index independent framework for deriving solar wind speed and coronal electron density from radio spectral broadening</i>
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Jan 2026	ISRO-ESA Workshop Thiruvananthapuram, India POSTER <i>Estimating solar wind speeds using Doppler broadening: results from MOM and Akatsuki</i>
Dec 2025	AGU Fall Meeting 2025 New Orleans, United States POSTER <i>Estimating solar wind speeds using Doppler broadening: results from MOM and Akatsuki</i> AGU Student Grant
Dec 2025	The Variable Sun Thiruvananthapuram, India POSTER <i>Estimating solar wind speeds using Doppler broadening: results from MOM and Akatsuki</i>
8-10 Sep 2025	ASI Symposium 003, Astronomical Society of India JECRC University, Jaipur, India POSTER <i>Probing the Smiley-Sun using Akatsuki radio signals</i>
Aug 2025	URSI Asia-Pacific Radio Science Conference (URSI AP-RASC 2025) International Convention Centre, Sydney, Australia TALK <i>Studying the 'Smiley Sun' using the Akatsuki radio occultation experiment</i>
4-7 Mar 2025	6th Indian Planetary Science Conference (IPSC) IIT Roorkee, India POSTER <i>On the estimation of solar wind velocity using spectral characteristics of the probing radio signals: results from solar occultation measurements using Indian Mars Orbiter Mission</i> Early Career Researcher Award, best poster
Oct 2024	3rd Indian Space Weather Conference IIT Roorkee, India TALK <i>Results from radio occultation studies using Indian Mars Orbiter Mission</i>
22-25 Oct 2024	6th URSI Regional Conference on Radio Science (URSI-RCRS) Graphic Era Hill University, Bhimtal, India POSTER <i>Results from radio occultation studies using Indian Mars Orbiter Mission</i>
Oct 2023	2nd Indian Space Weather Conference Physical Research Laboratory, Ahmedabad, India TALK <i>Unveiling space weather and planetary atmosphere dynamics through Aditya-L1 and DISHA data integration</i>
Sep 2023	Venus Science Conference Physical Research Laboratory, Ahmedabad, India TALK <i>Retrieving sulphuric acid profiles of the Venus atmosphere from Akatsuki radio occultation data</i>

Leadership and service

IIT Indore	Club Head, Astronomy, Space Engineering and Technology (AsSET) Club
IIT Indore	Public outreach: 100 Hours of Astronomy, National Space Day resources, school astronomy lab videos
NGO	Volunteer, Be Happier Soul Event management.

Technical skills

Languages	Python (NumPy, SciPy, Astropy, SunPy, Matplotlib), Jupyter
Tools	NASA SPICE toolkit, Git, JWST data reduction pipelines
Data	Planetary radio science data from ISRO, JAXA and ESA missions