Curriculum Vitae

James O'Donoghue, Ph.D

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Professional Summary

I am a planetary scientist specialising in observations of Jupiter and Saturn with the world's largest observatories. My research examines planetary upper-atmosphere processes like aurorae and Saturn's ring erosion and is widely covered by international media. I create educational animations to make astronomy accessible, with hundreds of millions of views across platforms (e.g. YouTube), and have contributed to documentaries for the BBC, PBS, and NHK Japan.

Research Experience

University of Reading, UK *STFC ERF Fellow & Research Associate Prof.* **November 2023 – present**

- To understand global energy drivers at Jupiter and estimate precisely the decay rate of Saturn's rings.

Japanese Space Agency (JAXA), Japan *JAXA Fellow & Research Associate Prof.* **May 2019 – October 2023**

- Observing Jupiter's upper atmosphere to find heat sources and investigating the detectability of H_3O^+ at Saturn.
- Discovery that Jupiter's aurorae globally heat the upper atmosphere. H_3O^+ not detected at Saturn.

NASA Goddard Space Flight Center, USA *NASA Postdoctoral Program Fellow* **January 2017 – March 2019**

- Led a study on 'ring rain' at Saturn, supported Juno spacecraft observations.
- Estimated Saturn's rings' decay rate limits their lifetime to 300 million years.

Boston University, USA *Research Scientist* **May 2014 – January 2017**

- Investigation into Jupiter's upper-atmospheric energy balance and Saturn's ring influence on the planet.
- Discovered Jupiter's Great Red Spot heats the upper atmosphere; Saturn's temperature too low to detect emissions.

Education

University of Leicester, UK **October 2010 – May 2014**
Ph.D. in Planetary Space Science *Supervisor: Dr. Tom Stallard*
Thesis: *The response of gas giant ionospheres to their local space environments*
Discoveries: Saturn's rings fall into the ionosphere & differences between Saturn's northern and southern aurorae.

Aberystwyth University, UK **2006 – 2010**
B.Sc. Planetary & Space Science *Grade: First-class hons.*
Dissertation: *A Study of Lunar Impact Flashes*

Awards

Recognition Award: University of Reading. **2024**
Achieving results, demonstrating excellence, working together and finding innovative solutions.

Finalist: American Association for Advancement of Science Award for Public Engagement with Science. **2022**

Winner: Europlanet Society Prize for Public Engagement with Science. **2021**
For work in creating high-quality space science animations and sharing them globally.

Prize: Elsie Pritchard Prize for achievement in physics. **2010**

Technical Skills

Programming Languages	Interactive Data Language (IDL), Python, LaTeX, TensorFlow (computer vision)
Digital Tools	Adobe Creative Suite, Blender 3D, MS Office 365 Suite
Further Skills	Animation creation, home astronomy, digital imaging

Grants Awarded

2024 Keck Observatory award of $14,000 as part of the award for Keck telescope time.

2023 Science and Technology Facilities Council Ernest Rutherford Fellowship over 5 years, $850,000.

2022 Keck Observatory award of $14,000 as part of the award for Keck telescope time.

2021 Keck Observatory award of $12,750 as part of the award for Keck telescope time.

2020 Keck Observatory award of $12,750 as part of the award for Keck telescope time.

2019 JAXA International Top Young Fellowship, PI, grant of $460,000.

2018 Keck Observatory award of $12,750 as part of the award for Keck telescope time.

2017 NASA grant NNH16ZDA001N-SSO: Solar System Observations, Science PI, $395,969.

2017 NASA Postdoctoral Program Fellowship, PI, award of $250,000 (not including overheads).

2017 Keck Observatory award of $11,000 as part of the award for Keck telescope time.

2016 Keck Observatory award of $15,000 as part of the award for Keck telescope time.

2014 NASA grant NNH13ZDA001N-PAST: Planetary Astronomy, main Co-I, $351,052.

2012 Royal Astronomical Society (United Kingdom) travel grant of $600.

Total: $2,399,900

Teaching and Mentoring

Mentoring

2024 – present Ph.D. Student, University of Reading – assisting with project

2023 – present Ph.D. Student, University of Northumbria – External Supervisor

2020 – 2021 Undergraduate Student, Tohoku University – Research Project Support

2016 – 2017 Master's Student, Boston University – Co-Mentor

University Teaching

2025 University of Reading; Physics of the Natural World (MT1PNW) – Delivered two lectures.

2012–2014 University of Leicester; Experimental Physics 1 (PA1900) – Led labs on telescope construction/use.

2013 University of Leicester; Mathematical Physics 1.1 (PA1710) – Supported teaching and grading.

Academic Service

Peer-Reviewer

Reviewed literature for *Geophysical Research Letters*, *Journal of Geophysical Research*, *Icarus*, *Nature Astronomy*, *Monthly Notices of the Royal Astronomical Society*, *Planetary Science Journal*, and the *Oxford Research Encyclopedia*.

Grant Proposal Reviewer (years omitted for discretion)

Yearly panelist and/or reviewer for NASA ROSES grant proposals and for the NASA Postdoctoral Program Fellowship. Served as a reviewer on a NASA Planetary Mission Senior Review. Served as a reviewer on UKRI Small Awards grants.

Telescope Proposal Reviewer

I regularly serve as a reviewer for proposals to both the Hubble Space Telescope and the James Webb Space Telescope.

Conference Leadership

JpGU 2025: Co-convener, P-PS01 - Outer Solar System Exploration Today, and Tomorrow

JpGU 2024: Co-convener, P-PS01 - Outer Solar System Exploration Today, and Tomorrow

AbSciCon 2022: Co-convener, 109 - From Prebiotic Chemistry to Astrobiology: Rise of Life On & Beyond Earth

EPSC-DPS 2019: Co-convener, EXO11 - Astrobiology: The Rise of Life on and Beyond Earth

AGU Fall 2018: Judge, Outstanding Student Poster Awards

AGU Fall 2017: Co-convener, SM41D - Moon-Plasma Interactions Throughout the Solar System II

AGU Fall 2016: Co-convener, SM41C - Moon-Plasma Interactions Throughout the Solar System I

PhD Examiner

Examined the PhD thesis of Mia Mace, University of Bristol, 2021.

Awarded Telescope Time

Year	Telescope	Nights (proposals)	Role	Topic
2025	JWST Cyc 4	12.5(2)	Co-I	Jupiter, Uranus and Neptune upper atmospheres
2025	W.M. Keck	1.5 (2)	Co-I	Uranus aurora drivers, Jupiter Juno support
2025	NASA IRTF	11.5(5)	Co-I	Jupiter, Saturn, Uranus upper atmospheres
2024	W.M. Keck	1.5	PI	Saturn: Auroras and Ring Rain with JWST
	W.M. Keck	6.5	Co-I	Jupiter: Juno support
	JWST Cyc 3	2.5 (2)	Co-I	Saturn and Uranus: auroral drivers
2025	NASA IRTF	6(2)	Co-I	Jupiter, Uranus upper atmospheres
2023	JWST Cyc 2	1.9	Co-I	Jupiter: upper atmosphere study
	NASA IRTF	4.0 (2)	Co-I	Jupiter, Uranus: energy crisis, ionosphere study
2022	W.M. Keck	1.0	PI	Exoplanet: aurora/ionosphere detection attempt
	W.M. Keck	6.0 (2)	Co-I	Jupiter, Uranus: Juno support, aurora mapping
	JWST Cyc 1	2.6	Co-I	Giant planets: early release science
2021	W.M. Keck	1.0	PI	Saturn: H_3O^+ detection attempt
	W.M. Keck	1.0	PI	Exoplanet: aurora/ionosphere detection attempt
	NASA IRTF	7.0 (2)	Co-I	Jupiter, Uranus: Juno support, aurora mapping
2020	W.M. Keck	1.0	PI	Saturn: ring rain search
	NASA IRTF	2.0	PI	Exoplanet: aurora/ionosphere detection attempt
	NASA IRTF	10.0 (2)	Co-I	Saturn, Jupiter: aurorae, Ganymede shadow
2019	NASA IRTF	2.5 (2)	Co-I	Saturn, Jupiter: ring rain, Juno support
2018	W.M. Keck	1.5	PI	Jupiter: Juno support
	W.M. Keck	1.5	Co-I	Jupiter: Juno support
	NASA IRTF	3.0	PI	Jupiter: Juno support
2017	W.M. Keck	1.5	PI	Jupiter: Juno support
	NASA IRTF	5.0 (2)	Co-I	Jupiter: Juno support
2016	W.M. Keck	2.0	PI	Jupiter: Juno support
	NASA IRTF	1.0	PI	Mars: H_3^+ search
	W.M. Keck	1.5	Co-I	Saturn: Cassini support
	NASA IRTF	2.0	Co-I	Jupiter: Juno support
2015	Gemini N.	3.0	Co-I	Saturn: solar influence on ionosphere
	NASA IRTF	6.0	PI	Jupiter: low-latitude heating
	NASA IRTF	8.5 (4)	Co-I	Saturn, Jupiter, Uranus and Titan
2014	W.M. Keck	2.0	Co-I	Saturn: Cassini support
	Gemini N.	4.0	Co-I	Saturn: auroral energy flows
	NASA IRTF	16.5 (3)	Co-I	Saturn, Jupiter: Cassini, Hisaki support
2013	W.M. Keck	4.0	Co-I	Saturn: Cassini support
	NASA IRTF	8.5 (2)	Co-I	Jupiter, Saturn: Cassini, Hisaki support
	Gemini N.	2.0	Co-I	Uranus: energy drivers in upper atmosphere
2012	NASA IRTF	5.5	PI	Jupiter: global ionosphere mapping
2011	NASA IRTF	18.0	Co-I	Jupiter, Saturn, Uranus: various topics
Total:		185 (50)		

Spacecraft Mission Support

Juno Mission to Jupiter (2016–present): Submitted proposals for telescope time on Keck observatory and NASA's Infrared Telescope Facility (IRTF) to support the Juno mission's observations of Jupiter's atmosphere and magnetosphere. These observations often required letters of support from NASA HQ, which were resourcefully obtained. Our observations continue to complement Juno in-situ data by providing contextual observations and ground-truth data, enhancing the science return of the mission.

James Webb Space Telescope ERS Program (2022): Selected as a collaborator in JWST's Early Release Science (ERS) observations of giant planets, which provided the first-ever data on Jupiter's ionosphere and auroral regions.

Cassini Mission to Saturn (2011–2017): Proposed and conducted observations using Keck and IRTF to support the Cassini spacecraft's exploration of Saturn. Observations focused on Saturn's aurorae and ring-planet coupling processes, providing ground-truths and contextual observations, again enhancing the return of the Cassini mission.

Peer Reviewed Journal Publications

51. Moore, L., Melin, H., Stallard, T., **O'Donoghue, J.**, Roberts, K., *et al.* Photochemistry in Jupiter's Ionosphere: Insights from Simultaneous H_3^+ and Electron Density Observations during Juno Perijove 54. *The Planetary Science Journal*, **7**, 25, doi: 10.3847/PSJ/ae2f49, 2026.

50. Roberts, K., Moore, L., **O'Donoghue, J.**, Melin, H., Stallard, T., *et al.* A Global View of Jupiter's Upper Atmosphere Through H_3^+. *The Astrophysical Journal Letters*, **998**, L13, doi: 10.3847/2041-8213/ae3c9b, 2026.

49. Owens, M. J., Barnard, L. A., Turner, H., ..., **O'Donoghue, J.** [6^{th}], *et al.* Driving Dynamical Inner-Heliosphere Models With In Situ Solar Wind Observations. *Space Weather*, **24**, e2025SW004675, doi: 10.1029/2025SW004675, 2026.

48. Melin, H., Fletcher, L. N., Hammel, H. B., Milam, S. N., ... **O'Donoghue, J.** [7^{th}], *et al.* The Ionosphere of Uranus as Revealed by JWST. *Geophysical Research Letters*, **52**, e2025GL118301, doi: 10.1029/2025GL118301, 2025.

47. Stallard, T. S., Knowles, K. L., Melin, H., Wang, R., ... **O'Donoghue, J.** [7^{th}], *et al.* Dominant Trends in Jupiter's H_3^+ Northern Aurora: II. Magnetospheric Mapping. *Journal of Geophysical Research: Space Physics*, **130**, e2025JA034076, doi: 10.1029/2025JA034076, 2025.

46. Stallard, T. S., Moore, L., Melin, H., Agiwal, O., ... **O'Donoghue, J.** [10^{th}], *et al.* JWST/NIRSpec Detection of Complex Structures in Saturn's Sub-Auroral Ionosphere and Stratosphere. *Geophysical Research Letters*, **52**, e2025GL116491, doi: 10.1029/2025GL116491, 2025.

45. Melin, H., Stallard, T. S., **O'Donoghue, J.**, *et al.* Temporal Variability of the Northern Infrared Aurora of Jupiter as Captured by JWST. *Journal of Geophysical Research: Space Physics*, **130**, e2025JA034261, doi: 10.1029/2025JA034261, 2025.

44. Tiranti, P. I., Melin, H., Moore, L., Knowles, K. L., ... **O'Donoghue, J.** [6^{th}], *et al.* Pole-to-Pole Vertical Ionospheric Profiles at Jupiter From JWST. *Journal of Geophysical Research: Space Physics*, **130**, e2025JA034066, doi: 10.1029/2025JA034066, 2025.

43. Stallard, T. S., Knowles, K. L., Melin, H., Wang, R., ... **O'Donoghue, J.** [7^{th}], *et al.* Dominant Drivers of Jupiter's H_3^+ Northern Aurora: 1. Magnetic Field Strength and Planetary Local Time. *Journal of Geophysical Research: Space Physics*, **130**, e2025JA034067, doi: 10.1029/2025JA034067, 2025.

42. Knowles, K. L., Stallard, T. S., **O'Donoghue, J.**, Moore, L., Agiwal, O., *et al.* Magnetic silhouettes in Jupiter's non-auroral ionosphere. *Journal of Geophysical Research: Space Physics*, **130**, e2025JA033868, doi: 10.1029/2025JA033868, 2025.

41. Nixon, C. A., Bézard, B., Cornet, T., Coy, B. P., .. **O'Donoghue, J.** [34^{th}], *et al.* The atmosphere of Titan in late northern summer from JWST and Keck observations. *Nature Astronomy*, doi: 10.1038/s41550-025-02537-3, 2025.

40. Roberts, K., Moore, L., **O'Donoghue, J.**, Melin, H., Stallard, T., *et al. Spatiotemporal Variations of Temperature in Jupiter's Upper Atmosphere. Planet. Sci. J.* **6**, 92, doi:10.3847/PSJ/adc09b, 2025.

39. **O'Donoghue, J.**, Moore, L., Stallard, T., Kurth, B., *et al.* Sub-auroral heating at Jupiter following a solar wind compression. Geophysical Research Letters, 52, e2024GL113751, doi: 10.1029/2024GL113751, 2025.

38. Thomas, E. M., Stallard, T. S., Melin, H., Chowdhury, M. N., .. **O'Donoghue, J.** [6^{th}], *et al.* Auroral and non-auroral H_3^+ ion winds at Uranus with Keck-NIRSPEC and IRTF-iSHELL. *Geophysical Research Letters*, 52, e2024GL112001, doi: 10.1029/2024GL112001, 2025.

37. Melin, H., Moore, L., Fletcher, L.N., Hammel, H.B. **J. O'Donoghue**, *et al.* Discovery of H_3^+ and infrared aurorae at Neptune with JWST. *Nature Astronomy*, doi: 10.1038/s41550-025-02507-9, 2025.

36. Wang, R., Stallard, T. S., Melin, H., Baines, K. H., .. **O'Donoghue, J.** [6^{th}], *et al.* Simultaneous Infrared Observations of the Jovian Auroral Ionosphere and Thermosphere. *Journal Geophysical Research Space Physics*, doi: 10.1029/2024JA032891, 2024.

35. Melin, H., **O'Donoghue, J.**, Moore, L., *et al.* Ionospheric irregularities at Jupiter observed by JWST. *Nat. Astron.* 8, 1000–1007, doi: 10.1038/s41550-024-02305-9, 2024.

34. Agiwal, O., Cao, H., Hsu, H-W., Moore, L., .. **O'Donoghue, J.** [6^{th}], et al. Current Events at Saturn: Ring–Planet Electromagnetic Coupling. *Planetary Science Journal* 5, 134, doi: 10.3847/PSJ/ad4343, 2024.

33. Bockelee-Morvan, D., Lellouch, E., Poch, O., Quirico, E., .. **O'Donoghue, J.** [22^{nd}], *et al.* Composition and thermal properties of Ganymede's surface from JWST/NIRSpec and MIRI observations. *Astronomy & Astrophysics* 681, p. A27, doi: 10.1051/0004-6361/202347326, 2024.

32. Cao, X., Chu, X., Hsu, H-W., Cao, H., .. **O'Donoghue, J.** [6^{th}], *et al.* Science return of probing magnetospheric systems of ice giants. *Front. Astron. Space Sci.* 11:1203705, doi: 10.3389/fspas.2024.1203705, 2024.

31. Wang, R., Stallard, T.S., Melin, H., Baines, K.H., .. **O'Donoghue, J.** [6^{th}], *et al.* Asymmetric ionospheric jets in Jupiter's aurora. *J. Geophys. Res. Space Phys.* 128, 12, doi: 10.1029/2023JA031861, 2023.

30. **O'Donoghue, J.** and Stallard, T., What the Upper Atmospheres of Giant Planets Reveal. *Remote Sensing*, 14, 6326, doi: 10.3390/rs14246326, 2022.

29. Chowdhury, M. N., Stallard, T.S., Baines, K.H., Provan, G., .. **O'Donoghue, J.** [8^{th}], *et al.* Saturn's weather-driven aurorae modulate oscillations in the magnetic field and radio emissions. *Geophys. Res. Lett.*, doi: 10.1029/2021GL096492, 2022.

28. **O'Donoghue, J.**, Moore, L., Melin, H., Stallard, T.S., *et al.* Global upper-atmospheric heating on Jupiter by the polar aurorae. *Nature*, doi: 10.1038/s41586-021-03706-w, 2021.

27. Moore, L., Moses, J.I., Melin, H., Stallard, T.S., **O'Donoghue, J.**, *et al.* Atmospheric implications of the lack of H_3^+ detection at Neptune. *Phil. Trans. R. Soc. A.* 37820200100, doi: 10.1098/rsta.2020.0100, 2020.

26. Yurchenko, S.N., Tennyson, J., Miller, S., Melnikov, V.V., **O'Donoghue, J.**, *et al.* ExoMol line lists – XL. Rovibrational molecular line list for the hydronium ion (H_3O^+). *Monthly Notices of the Royal Astronomical Society*, 497(2), Pages 2340-2351, doi: 10.1093/mnras/staa2034, 2020.

25. **O'Donoghue, J.**, Moore, L., Connerney, J.E.P., Melin, H., *et al.* Observations of the chemical and thermal response of 'ring rain' on Saturn's ionosphere. *Icarus*, 322, Pages 251-260, doi: 10.1016/j.icarus.2018.10.027, 2019.

24. Moore, L., Melin, H., **O'Donoghue, J.**, *et al.* Modelling H_3^+ in planetary atmospheres: effects of vertical gradients. *Phil. Trans. R. Soc. A.* 377, 20190067, doi: 10.1098/rsta.2019.0067, 2019.

23. Ray, L.C., Lorch, C.T.S., **O'Donoghue, J.**, *et al.* Why is the H_3^+ hot spot above Jupiter's Great Red Spot so hot? *Phil. Trans. R. Soc. A.* 377, 20180407, doi: 10.1098/rsta.2018.0407, 2019.

22. Melin, H., Fletcher, L.N., Stallard, T.S., .. **O'Donoghue, J.** [7^{th}], *et al.* The H_3^+ ionosphere of Uranus: decades-long cooling and local-time morphology. *Phil. Trans. A.*, doi: 10.1098/rsta.2018.0408, 2019.

21. Stallard, T., Baines, K., Melin, H., Bradley, T., .. **O'Donoghue, J.** [6^{th}], *et al.* Local-time averaged maps of H_3^+ emission, temperature and ion winds. *Phil. Trans. A.*, doi: 10.1098/rsta.2018.0405, 2019.

20. Moore, L., Galand, M., Kliore, A., Nagy, A., **O'Donoghue, J.** [5^{th}], *et al.* Saturn's ionosphere: ring rain and other drivers. *In book chapter: Saturn in the 21st Century*, Cambridge University Press, doi: 10.1017/9781316227220, 2018.

19. Hsu, H. W., Schmidt, J., Kempf, S., .. **O'Donoghue, J.** [15^{th}], *et al.* In situ collection of dust grains falling from Saturn's rings into its atmosphere. *Science*, 362 (6410), doi: 10.10.1126/science.aat3185, 2018.

18. Stallard, T., Burrell, A. G., Melin, H., .. **O'Donoghue, J.** [7^{th}], *et al.* Identification of Jupiter's magnetic equator through H_3^+ ionospheric emission. *Nat. Astron.*, 2(7), doi: 10.1038/s41550-018-0523-z, 2018.

17. Melin, H., Fletcher, L. N., Stallard, T. S., Johnson, R. E., **O'Donoghue, J.**, *et al.* The quest for H_3^+ at Neptune: deep burn observations with NASA IRTF iSHELL. *Monthly Notices of the Royal Astronomical Society*, 474(3), Pages 3714-3719, doi: 10.1093/mnras/stx3029, 2018.

16. **O'Donoghue, J.**, Moore, L., Connerney, J. E. P., Melin, H., *et al.* Re-detection of the ionospheric H_3^+ signature of Saturn's "ring rain". *Geophys. Res. Lett.*, 44(11), Pages 11762-11769, doi: 10.1002/2017GL075932, 2017.

15. Stallard, T., Melin, H., Miller, S., Moore, L., **O'Donoghue, J.**, *et al.* Great Cold Spot in Jupiter's upper atmosphere. *Geophys. Res. Lett.*, 44(7), Pages 3000-3008, doi: 10.1002/2016GL071956, 2017.

14. Moore, L., **O'Donoghue, J.**, Melin, H., Stallard, T., *et al.* Variability of Jupiter's IR H_3^+ aurorae during Juno approach. *Geophys. Res. Lett.*, 44, Pages 4513-4522, doi: 10.1002/2017GL073156, 2017.

13. **O'Donoghue, J.**, Moore, L., Stallard, T. S., Melin, H., *et al.* Heating of Jupiter's upper atmosphere above the Great Red Spot. *Nature*, 536(7615), Pages 190-192, doi: 10.1038/nature18940, 2016.

12. Stallard, T., Clarke, J. T., Melin, H., Miller, .. **O'Donoghue, J.** [6^{th}], *et al.* Stability within Jupiter's polar auroral 'Swirl region' over moderate timescales. *Icarus*, 268, 145-155, doi: 10.1016/j.icarus.2015.12.044, 2016.

11. **O'Donoghue, J.**, Melin, H., Stallard, T. S., Provan, G., Moore, L., *et al.*. Ground-based observations of Saturn's auroral ionosphere over three days: trends in H_3^+ temperature, density and emission with Saturn local time and planetary period oscillation. *Icarus*, 263, 44-55, doi: 10.1016/j.icarus.2015.04.018, 2016.

10. Melin, H., Badman, S. V., Stallard, T. S., Cowley, S. W. H., .. **O'Donoghue, J.** [7^{th}], *et al.* Simultaneous multi-scale and multi-instrument observations of Saturn's aurorae during the 2013 observing campaign. *Icarus*, 263, 56-74, doi: 10.1016/j.icarus.2015.08.021, 2016.

9. Stallard, T. S., Melin, H., Miller, S., Badman, .. **O'Donoghue, J.** [8^{th}], *et al.*. Cassini VIMS observations of H_3^+ emission on the nightside of Jupiter. *J. Geophys. Res. Space Physics*, 120, 6948-6973, doi: 10.1002/2015JA021097, 2016.

8. Moore, L., **O'Donoghue, J.**, Mueller-Wodarg, I., Galand, M., Mendillo, M. Saturn ring rain: Model estimates of water influx into Saturn's atmosphere. *Icarus*, 245, 355-366, doi: 10.1016/j.icarus.2014.08.041, 2015.

7. Mousis, O., Fletcher, L.N., .. **O'Donoghue, J.** [32^{nd}], *et al.* Scientific rationale for Saturn's in situ exploration. *Planetary and Space Science*, 104, 29-47, doi: 10.1016/j.pss.2014.09.014, 2014.

6. Melin, H., Stallard, T.S., **O'Donoghue, J.**, *et al.* On the anti-correlation between H_3^+ temperature and density in giant planet ionospheres. *Mon. Not. R. Astron. Soc.*, doi: 10.1093/mnras/stt2299, 2013.

5. **O'Donoghue, J.**, Stallard, T.S., Melin, H., Cowley, S.W.H., *et al.* Conjugate observations of Saturn's northern and southern aurorae. *Icarus*, 229, 214-220, doi: 10.1016/j.icarus.2013.11.009, 2013.

4. **O'Donoghue, J.**, Stallard, T.S., Melin, H., Jones, G.H., *et al.*. The domination of Saturn's low-latitude ionosphere by ring 'rain". *Nature*, 496(7444), 193-195, doi: 10.1038/nature12049, 2013.

3. Melin, H., Stallard, T.S., S. Miller, T.R. Geballe, .. **O'Donoghue, J.** [6^{th}], Post-equinoctial observations of the ionosphere of Uranus. *Icarus*, 223(2), 741-748, doi: 10.1016/j.icarus.2013.01.012, 2013.

2. Stallard, T.S., Melin, H., Miller, S., **O'Donoghue, J.**, *et al.* Temperature changes and energy inputs in giant planet atmospheres: what we are learning from H_3^+. *Phil. Trans. Roy. Soc.*, 370, 5213-5224, doi: 10.1098/rsta.2012.0028, 2012.

1. Melin, H., Stallard, T.S., S. Miller, Gustin, J., .. **O'Donoghue, J.** [8^{th}], *et al.* Simultaneous Cassini VIMS and UVIS observations of Saturn's southern aurora: Comparing emissions from H, H_2 and H_3^+ at a high spatial resolution. *Geophys. Res. Lett.*, 38, L15203, doi: 10.1029/2011GL048457, 2011.

Acknowledgements in Peer Reviewed Publications

1. Hyodo, R., Genda, H., & Madeira, G. *Pollution resistance of Saturn's ring particles during micrometeoroid impact. Nature Geoscience* 18, 44–49. DOI: 10.1038/s41561-024-01598-9.

Invited Talks: Conferences and Seminars

2026 Speaker at Asia Oceania Geosciences Society (AOGS). [Japan]

2025 Speaker at Royal Astronomical Society Early Career Event. [UK]

2025 Speaker for Spectroscopy of Exoplanets Over All Wavelengths on 'Solar system giant planet upper atmospheres' Broxbourne. [UK]

2025 Speaker at student-led Space Exe 2025 conference, University of Exeter. [UK]

2024 Keynote speaker at a Department of Meteorology event, University of Reading. [UK]

2024 Graduate Student Invited Seminar Speaker, Boston University. [US]

2024 Speaker at the International Space Science Institute (ISSI) on 'Jupiter's non-auroral Upper Atmosphere'. [Switzerland]

2023 Talk at Japan Geoscience Union (JpGU), 'Investigations of Giant Planet Upper Atmospheres: Past, Present and Future'. [Japan]

2023 Talk for JAXA/ISAS Diversity Promotion, 'The Experience of Researching Internationally'. [Japan]

2022 Seminar at JAXA/ISAS Coffee Talk, 'A planetary-scale heat wave in Jupiter's upper atmosphere'. [Japan]

2022 Talk at ISSI, Bern, Switzerland, 'New and future observations of Saturn and insights for Jupiter, Uranus and Neptune' as part of 'ring–planet interactions' meeting. [Switzerland]

2021 Seminar at JAXA/ISAS Planetary Exploration Workshop, 'Future Science at the Outer Planets'. [Japan]

2021 Keynote Speaker for Outer Planet Systems, EuroPlanet Science Congress (EPSC), 'What the upper atmospheres of Giant Planets reveal'. [Virtual]

2021 Talk at European Planetary Science Congress (EPSC), 'Global upper-atmospheric heating at Jupiter by the recirculation of auroral energy'. [Virtual]

2021 Award-acceptance talk at Talk at European Planetary Science Congress (EPSC) for the Europlanet Prize for Public Engagement. [Virtual]

2021 Talk at Royal Astronomical Society, 'Observational evidence for upper-atmospheric heat transfer to Jovian equatorial latitudes from the auroral regions'. [Virtual]

2020 Seminar at Japan Science Communication Forum, 'Animated Science Communication'. [Japan]

2019 Seminar at Earth–Life Sciences Institute, Tokyo, 'Saturn's Rings and Jupiter's Great Red Spot: an animated discussion'. [Japan]

2018 Seminar at Catholic University of America, 'Revealing the inner-workings of Saturn's Rings and Jupiter's Great Red Spot with ionospheric measurements'. [US]

2018 Talk at Talk at European Planetary Science Congress (EPSC), 'Ground-based observations of Giant Planet upper atmospheres'. [Germany]

2017 Seminar at NASA Goddard Space Flight Center, 'Heating of Jupiter's upper atmosphere by the Great Red Spot'. [US]

2016 Talk at American Geophysical Union (AGU) conference, 'Searching for sources of planet-wide heating in Jupiter's upper atmosphere: new clues from the Great Red Spot'. [US]

2016 Seminar at University of New Hampshire, Ground-based observations of Jupiter and Saturn: aurora, ring rain and Jupiter's Great Red Spot'. [US]

2015 Seminar at Georgia Institute of Technology, Observations of gas giant ionospheres'. [US]

2015 Talk at Magnetospheres of the Outer Planets (MOP) conference, Ground-based observations of planetary aurorae'. [US]

2013 Talk at International Space Science Institute (ISSI), part of the second 'Comparative Jovian Aeronomy' meeting on 'Saturn's ring rain'. [Switzerland]

2012 Talk at International Space Science Institute (ISSI), 'Saturn's auroral energy balance' as part of Comparative Jovian Aeronomy' meeting. [Switzerland]

Invited talk declined due to scheduling constraints: Asia Oceania Geosciences Society (AOGS) 2025

Science Communication

Space-Themed Educational Animations

Overview and Impact: Produced approximately 75 original space-themed animations to explain complex space science and physics concepts, achieving over 400 million views across social media platforms (Twitter, YouTube, Reddit, Instagram, LinkedIn) and generating hundreds of news articles.

Educational Use: Incorporated as educational resources at all levels, from elementary schools to Ivy League institutions (e.g., Stanford University), and featured in prominent planetariums and museums, including the Smithsonian Air and Space Museum.

Distribution and Following: Released via Twitter @physicsJ and YouTube to an amassed following of ∼250,000.

Community Engagement and Media Appearances

2025 Led live-viewing telescope booth at University of Reading's Winter Festival. [UK]

2025 Led NASA Observe the Moon Night at University of Reading: audience 500 in person, 800 online. [UK]

2025 Led live Sun-viewing session on a stall at the University of Reading's Community Festival. [UK]

2025 Invited Speaker for the Shropshire Astronomical Society April meeting on the topic of Saturn's rings. [UK]

2024 Documentary appearance for BBC's Solar System with Prof. Brian Cox, Episode 5, Strange Worlds. [UK]

2024 Documentary appearance, on location in the Canary Islands, for PBS NOVA, Strange Worlds. [USA]

2024 Led NASA Observe the Moon Night at University of Reading: audience 200 in person, 1,000 online. [UK]

2024 Delivered two public lectures at the Royal Astronomical Society, Burlington House, London. [UK]

2023 Consultant and featured expert, Space chapter of Britannica's Encyclopedia Infographica. [UK]

2023 Animation featured in Cosmic Front, a documentary by NHK. [Japan]

2022 Animation featured in Are You Smarter than a 5th Grader. [Japan]

2022 Created fly-by animations for the BepiColombo mission's June 2022 flyby of Mercury. [Japan]

2022 Organised Observe the Moon Night, serving as JAXA–NASA liaison. [Japan]

2022 Chaired Hayabusa2 and Beyond live event for JAXA, British Science Museum. [UK/Japan]

2021 Organised Observe the Moon Night, serving as JAXA–NASA liaison. [USA/Japan]

2021 Created fly-by animations for BepiColombo's August 2021 flyby of Venus. [Japan]

2021 Co-hosted live Uranus-observing event with the Royal Astronomical Society. [UK]

2021 Co-organised public broadcast, JAXA Institute of Space and Astronautical Science Open Day. [Japan]

2020 Presented seminar at American School in Japan, An Animated Tour of the Solar System. [Japan]

2019 Hosted an exhibit using animations at JAXA Institute of Space and Astronautical Science Open Day. [Japan]

2019 Appeared in Strip the Cosmos, Discovery Channel documentary on Saturn's rings. [Japan]

2018 Appeared in Space's Deepest Secrets, Science Channel documentary on Saturn's rings. [USA]

2018 Astronomy on Tap public lecture on Jupiter and Saturn, DC9 nightclub in Washington D.C. [USA]

2017 Appeared in NHK Japan's Cosmic Front, discussing Jupiter's Great Red Spot. [Japan]

2016 Press release after Nature publication on Jupiter's Great Red Spot, featured by over 100 news outlets. [World]

2014 Volunteer for BBC's Stargazing Live, promoting the study of Jupiter and Saturn. [UK]

2014 Invited speaker at Stratford-upon-Avon Astronomical Society, Saturn's Ring Rain. [UK]

2014 Participated in Live at the Observatory at the Keck telescope, with live Q&A, audience of 1,000. [World]

2013 Invited appearance on BBC Radio Leicester as a panel expert on space. [UK]

2013 Press release on Nature publication on Saturn's ring rain discovery; covered by over 100 news outlets. [World]

2012 Conducted live outreach from NASA's Infrared Telescope Facility (IRTF) to schools and universities. [World]

Services to Education

2025 Presented a specialist solar system talk to Higher Project Qualification students in London (high school)

2024 Delivered a solar system talk with a Q&A session to the Astronomy Education and Outreach Network (AEON), a national network of GCSE Astronomy teachers in the UK (high school)

2024 Delivered a career talk to students and gave telescope demonstration at two local schools (primary schools)

Training

2024 MediaFirst media interview training. Including mock TV, radio, print news interviews.

2024 Writing for REF workshop at University of Reading.

2023 James Webb Space Telescope Proposal Workshop.

2020 Coursera course in *Python For Everybody* by the University of Michigan.

2015 Intensive telescope support astronomer training at Gemini telescope, Mauna Kea, Hawaii.

2012 STFC Summer school in Solar System Plasmas at Armagh Observatory

2010 STFC Summer school in Solar Physics at Leeds University