

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**
- Q 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**
- Q 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**
- Q 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**
- Q 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 hon.*
Dissertation: *A Study of Lunar Impact Flashes*

Awards

- Carl Sagan Medal for Excellence in Public Communication in Planetary Science.** **2026**
To recognize and honor outstanding communication by an active planetary scientist to the general public.
- Recognition Award at 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**
- Europlanet Society Prize for Public Engagement with Science.** **2021**
Awarded to those who have developed innovative and socially impactful practices in planetary science communication.
- Elsie Pritchard Prize for achievement in physics.** **2010**

Technical Skills

- Programming Languages** Interactive Data Language (IDL), Python, LaTeX
- Digital Tools** Adobe After Effects & Premiere Pro, Blender 3D, MS Office 365
- Further Skills** Digital animation, 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

- 2026 – present Ph.D. Student, University of Reading – Supervisor
- 2026 – present Ph.D. Student, University of Reading – Second Supervisor
- 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

- 2026 University of Reading; Meteorology Research Projects (MT3RPNU) – Presentation/Dissertation marking.
- 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 ₃ O ⁺ 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.

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54. Knowles, K. L., Melin, H., Stallard, T. S., Moore, L., **O'Donoghue, J.**, et al. Short-Term Variability of Jupiter's Satellite Footprints as Spotted by JWST. *Geophys. Res. Lett.* 53, e2025GL118553, doi:10.1029/2025GL118553, 2026.
53. Stallard, T. S., Moore, L., Melin, H., Smith, C. G. A., ... **O'Donoghue, J.** [11th] et al. JWST/NIRSpec reveals the atmospheric driver of Saturn's variable magnetospheric rotation rate. *Journal of Geophysical Research: Space Physics*, 131, e2025JA034578, doi.org/10.1029/2025JA034578, 2026.
52. Tiranti, P. I., Melin, H., Moore, L., Thomas, E. M., ..., **O'Donoghue, J.** [8th], et al. JWST Discovers the Vertical Structure of Uranus' Ionosphere. *Geophys. Res. Lett.* 53, e2025GL119304, doi:10.1029/2025GL119304, 2026.
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.
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48. Melin, H., Fletcher, L. N., Hammel, H. B., Milam, S. N., ... **O'Donoghue, J.** [7th], 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.** [7th], 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.** [10th], 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.
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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](https://doi.org/10.1038/nature12049), 2013.
3. Melin, H., Stallard, T.S., S. Miller, T.R. Geballe, .. **O'Donoghue, J.** [6th], Post-equinoctial observations of the ionosphere of Uranus. *Icarus*, 223(2), 741-748, doi: [10.1016/j.icarus.2013.01.012](https://doi.org/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 H₃⁺. *Phil. Trans. Roy. Soc.*, 370, 5213-5224, doi: [10.1098/rsta.2012.0028](https://doi.org/10.1098/rsta.2012.0028), 2012.
1. Melin, H., Stallard, T.S., S. Miller, Gustin, J., .. **O'Donoghue, J.** [8th], *et al.* Simultaneous Cassini VIMS and UVIS observations of Saturn's southern aurora: Comparing emissions from H, H₂ and H₃⁺ at a high spatial resolution. *Geophys. Res. Lett.*, 38, L15203, doi: [10.1029/2011GL048457](https://doi.org/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](https://doi.org/10.1038/s41561-024-01598-9).

Invited Talks: Conferences and Seminars

- 2026** Carl Sagan Medal-acceptance public talk at Division of Planetary Sciences. [USA]
- 2026** Seminar at Northumbria University, ‘Saturn’s Ring–ionosphere Coupling’. [UK]
- 2025** Talk at Royal Astronomical Society Early Career Event. [UK]
- 2025** Talk for Spectroscopy of Exoplanets on ‘Solar system giant planet upper atmospheres’ Broxbourne. [UK]
- 2025** Talk 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** Talk at the International Space Science Institute (ISSI) on ‘Jupiter’s non-auroral Upper Atmosphere’. [Switz.]
- 2023** Talk at Japan Geoscience Union (JpGU), ‘Investigations of Giant Planet Upper Atmospheres’. [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 International Space Science Institute (ISSI) on ‘Observations of Giant Planets’. [Switz.]
- 2021** Seminar at JAXA/ISAS Planetary Exploration Workshop, ‘Future Science at the Outer Planets’. [Japan]
- 2021** Keynote at EuroPlanet Science Congress (EPSC), ‘The upper atmospheres of Giant Planets reveal’. [Virtual]
- 2021** Talk at EuroPlanet Science Congress (EPSC), ‘Global heating by recirculation of auroral energy’. [Virtual]
- 2021** Prize for Public Engagement-acceptance talk at EuroPlanet Science Congress (EPSC). [Virtual]
- 2021** Talk at Royal Astronomical Society, ‘Upper-atmospheric heat transfer to Jovian equatorial latitudes’. [Virtual]
- 2020** Seminar at Japan Science Communication Forum, ‘Animated Science Communication’. [Japan]
- 2019** Seminar at Earth–Life Sci. Institute, ‘Saturn’s Rings and Jupiter’s Great Red Spot’. [Japan]
- 2018** Seminar at Catholic University of America, ‘Revealing the inner-workings of Saturn and Jupiter’. [US]
- 2018** Talk at Europlanet Science Congress (EPSC), ‘Ground-based observations of Giant Planets’. [Germany]
- 2017** Seminar at NASA Goddard Space Flight Center, ‘Heating of Jupiter’s atmosphere by Great Red Spot’. [US]
- 2016** Talk at American Geophysical Union (AGU), ‘Searching for sources of planet-wide heating at Jupiter’. [US]
- 2016** Seminar at U. New Hampshire, ‘Ground-based observations of Jupiter and Saturn’. [US]
- 2015** Seminar at Georgia Institute of Technology, Observations of gas giant ionospheres’. [US]
- 2015** Talk at Magnetospheres of the Outer Planets (MOP), ‘Ground-based observations of planetary aurorae’. [US]
- 2013** Talk at International Space Science Institute (ISSI) on ‘Saturn’s ring rain’. [Switz.]
- 2012** Talk at International Space Science Institute (ISSI), ‘Saturn’s auroral energy balance’. [Switz.]

Invited talks declined due to scheduling constraints: Asia Oceania Geosciences Society (AOGS) in 2025 and 2026

Space-Themed Educational Animations

Overview and Impact: Produced over 75 original space-themed animations to explain complex space science and physics concepts, gathering over 400 million views across social media platforms (Twitter, YouTube, Facebook, 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

- 2026 Led live-viewing telescope booth at Goring Gap Festival. [UK]
- 2026 Led live-viewing telescope booth at University of Reading's Community 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