

Joshua Dreyer

Postdoctoral Researcher
Aeronomy, Ionospheric and Planetary Science

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EXPERIENCE

- 2025 – 2026 **Consultant for ESA ITT:** Development of Enceladus plasma environment model, Royal Observatory of Belgium / Swedish Institute of Space Physics
- 2024 – 2026 **Postdoctoral Researcher:** Studying Earth's ionosphere with global TEC maps, Royal Observatory of Belgium, Brussels
- 2019 – 2023 **PhD Student:** Saturn's equatorial ionosphere – Cassini data and photochemical models, Swedish Institute of Space Physics & Uppsala University, Sweden

EDUCATION

- 2019 – 2023 **PhD in Space Physics**, Swedish Institute of Space Physics & Uppsala University, Sweden
- 2017 – 2019 **MSc in Physics** (Astronomy and Space Physics), Uppsala University, Sweden
Courses in Arctic Geophysics, The University Centre in Svalbard, Norway
- 2012 – 2017 **BSc in Physics**, University of Hamburg, Germany

ACADEMIC SERVICE & AFFILIATIONS

Community Service

- 2020 – 2022 Early Career Scientists (ECS) Representative for the European Geosciences Union (EGU) Division on Planetary and Solar System Sciences (PS)
- 2018 – 2019 Student Council and Student Welfare Leader at the University Centre in Svalbard (UNIS)

Reviewer

Geophysical Research Letters
NASA ROSES 2024 Cassini Data Analysis Program
NASA SCUBED 2025

Conference Convener/Chair

- 2025 **Early Career Day 2025, Space Pole, Brussels, Belgium**
Dreyer, J., Tzvetkov, D., Vervalcke, S.

2023 EGU General Assembly 2023, Vienna, Austria

Session: PS6.2 - Gas Giant System Exploration in the Solar System and Beyond
Dreyer, J., Hadid, L., Waite, J. H.

2022 EGU General Assembly 2022, Vienna, Austria

Session: PS7.3 - Gas and Ice Giant System Exploration in the Solar System and Beyond
Dreyer, J., Johansson, F. L., Hadid, L., Waite, J. H.

2021 EGU General Assembly 2021, Online

Networking: NET38 - PS-event for all division members.
 Networking: NET18 - PS ECS-event.

2020 EGU General Assembly 2020, Online

Networking: NET9 - Networking with the ECS of the PS division.

TEACHING

2021 – 2023 1FA104: Mekanik (yearly in spring semester, undergraduate, *Uppsala University*)
 Responsible for supervising and grading laboratory experiments

OUTREACH

2021 Presentation for the Aurorasaurus citizen science project on Fragmented Aurora-like Emissions (FAEs), [▶ Aurorasaurus Q&A on FAEs with Joshua Dreyer and Daniel Whiter](#)

AWARDS

2024 Poster Competition Jury Prize, Space Pole Early Career Day 2024, Presentation Title: Global VTEC Maps of the Geomagnetic Storm in May 2024 Produced with the ROB-IONO Software and Median Polish Kriging Interpolation

2023 Outstanding Student Presentation Award (OSPA), American Geophysical Union (AGU), Presentation Title: [Electron to Light Ion Density Ratios During Cassini's Grand Finale: Addressing Open Questions About Saturn's Low-latitude Ionosphere](#)

LANGUAGES

German Native

English Fluent (IELTS: CEFR Level C2 obtained in 2017)

Swedish Intermediate (CEFR Level B1 course completed in 2020)

Norwegian Basic

JOURNAL ARTICLES

- 1 Wahlund, J.-E., A. I. Eriksson, M. W. Morooka, S. Buchert, M. Persson, E. Vigren, **J. Dreyer**, et al. (2025). “On the equatorial dayside ionosphere of Saturn – In-situ observations give evidence for a dynamic and layered structure in disequilibrium”. In: *Icarus*, p. 116647. ISSN: 0019-1035. DOI: [10.1016/j.icarus.2025.116647](https://doi.org/10.1016/j.icarus.2025.116647).
- 2 **Dreyer, J.**, E. Vigren, F. L. Johansson, and J. H. Waite (2023). “Utilizing Helium Ion Chemistry to Derive Mixing Ratios of Heavier Neutral Species in Saturn’s Equatorial Ionosphere”. In: *Journal of Geophysical Research: Space Physics* 128.6, e2023JA031488. DOI: [10.1029/2023ja031488](https://doi.org/10.1029/2023ja031488).
- 3 **Dreyer, J.**, E. Vigren, F. L. Johansson, O. Shebanits, M. Morooka, J.-E. Wahlund, R. S. Perryman, and J. H. Waite (2022). “Identifying Shadowing Signatures of C Ring Ringlets and Plateaus in Cassini Data from Saturn’s Ionosphere”. In: *The Planetary Science Journal* 3.7, p. 168. DOI: [10.3847/psj/ac7790](https://doi.org/10.3847/psj/ac7790).
- 4 Johansson, F. L., E. Vigren, J. H. Waite, K. Miller, A. I. Eriksson, N. J. T. Edberg, and **J. Dreyer** (2022). “Implications from secondary emission from neutral impact on Cassini plasma and dust measurements”. In: *Monthly Notices of the Royal Astronomical Society* 515.2, pp. 2340–2350. DOI: [10.1093/mnras/stac1856](https://doi.org/10.1093/mnras/stac1856).
- 5 Vigren, E., **J. Dreyer**, A. I. Eriksson, F. L. Johansson, M. Morooka, and J.-E. Wahlund (2022). “Empirical Photochemical Modeling of Saturn’s Ionization Balance Including Grain Charging”. In: *The Planetary Science Journal* 3.2, p. 49. DOI: [10.3847/psj/ac4eee](https://doi.org/10.3847/psj/ac4eee).
- 6 **Dreyer, J.**, N. Partamies, D. Whiter, P. G. Ellingsen, L. Baddeley, and S. C. Buchert (2021). “Characteristics of fragmented aurora-like emissions (FAEs) observed on Svalbard”. In: *Annales Geophysicae* 39.2, pp. 277–288. DOI: [10.5194/angeo-39-277-2021](https://doi.org/10.5194/angeo-39-277-2021).
- 7 **Dreyer, J.**, E. Vigren, M. Morooka, J.-E. Wahlund, S. C. Buchert, F. L. Johansson, and J. H. Waite (2021). “Constraining the Positive Ion Composition in Saturn’s Lower Ionosphere with the Effective Recombination Coefficient”. In: *The Planetary Science Journal* 2.1, p. 39. DOI: [10.3847/psj/abd6e9](https://doi.org/10.3847/psj/abd6e9).
- 8 Whiter, D. K., H. Sundberg, B. S. Lanchester, **J. Dreyer**, N. Partamies, N. Ivchenko, M. Zaccaria Di Fraia, et al. (2021). “Fine-scale dynamics of fragmented aurora-like emissions”. In: *Annales Geophysicae* 39.6, pp. 975–989. DOI: [10.5194/angeo-39-975-2021](https://doi.org/10.5194/angeo-39-975-2021).

CONFERENCE PROCEEDINGS

- 1 **Dreyer, J.**, J.-M. Chevalier, and N. Bergeot (2025). “Global VTEC Maps of the Geomagnetic Storm in May 2024 and Their Application to Study the Evolution of the Ionospheric and Plasmaspheric VTEC Distribution”. In: *EGU General Assembly Conference Abstracts*, EGU25–12567. DOI: [10.5194/egusphere-egu25-12567](https://doi.org/10.5194/egusphere-egu25-12567).
- 2 **Dreyer, J.**, E. Vigren, F. L. Johansson, L. Hadid, M. Morooka, J.-E. Wahlund, and J. H. Waite (2024). “Electron to Light Ion Density Ratios During Cassini’s Grand Finale: Addressing Open Questions About Saturn’s Low-latitude Ionosphere”. In: *EGU General Assembly Conference Abstracts*, p. 10549. DOI: [10.5194/egusphere-egu24-10549](https://doi.org/10.5194/egusphere-egu24-10549).
- 3 **Dreyer, J.**, E. Vigren, F. L. Johansson, and J. H. Waite (2023). “Deriving mixing ratios of heavier neutral species in Saturn’s ionosphere from light ion measurements and helium chemistry”. In: *EGU General Assembly Conference Abstracts*. Copernicus GmbH. DOI: [10.5194/egusphere-egu23-14642](https://doi.org/10.5194/egusphere-egu23-14642).

- 4 **Dreyer, J.**, E. Vigren, F. L. Johansson, J. H. Waite, L. Hadid, M. W. Morooka, and J.-E. Wahlund (2023). “Electron to Light Ion Density Ratios During Cassini’s Grand Finale: Addressing Open Questions About Saturn’s Low-latitude Ionosphere”. In: *AGU Fall Meeting Abstracts*. Vol. 2023, SM43C–3112.
- 5 **Dreyer, J.**, N. Partamies, D. Whiter, P. G. Ellingsen, L. Baddeley, and S. C. Buchert (2022). “Characteristics of Fragmented Aurora-like Emissions (FAEs)”. In: *EGU General Assembly Conference Abstracts*, Egu22–5686. DOI: [10.5194/egusphere-egu22-5686](https://doi.org/10.5194/egusphere-egu22-5686).
- 6 **Dreyer, J.** and E. Vigren (2022). “Deriving mixing ratios of heavier neutral species in Saturn’s ionosphere from light ion measurements”. In: *European Planetary Science Congress*, Epsc2022–1053. DOI: [10.5194/epsc2022-1053](https://doi.org/10.5194/epsc2022-1053).
- 7 **Dreyer, J.** and E. Vigren (2021). “Ionospheric shadowing signatures of ringlets and plateaus in Saturn’s C Ring”. In: *EGU General Assembly Conference Abstracts*, Egu21–13316. DOI: [10.5194/egusphere-egu21-13316](https://doi.org/10.5194/egusphere-egu21-13316).
- 8 **Dreyer, J.**, E. Vigren, O. Shebanits, M. Morooka, J.-E. Wahlund, and J. Waite (2021). “Identifying Ionospheric Shadowing Signatures of Ringlets and Plateaus in Saturn’s C Ring”. In: *AGU Fall Meeting Abstracts*. Vol. 2021, P35e–2166.
- 9 **Dreyer, J.**, E. Vigren, O. Shebanits, M. Morooka, J.-E. Wahlund, and J. H. Waite (2021). “Identifying ionospheric shadowing signatures of ringlets and plateaus in Saturn’s C Ring”. In: *European Planetary Science Congress*, Epsc2021–753. DOI: [10.5194/epsc2021-753](https://doi.org/10.5194/epsc2021-753).
- 10 **Dreyer, J.**, E. Vigren, M. Morooka, J.-E. Wahlund, S. Buchert, and J. H. Waite (2020). “On the effective recombination coefficient in Saturn’s ionosphere”. In: *EGU General Assembly Conference Abstracts*, p. 9813. DOI: [10.5194/egusphere-egu2020-9813](https://doi.org/10.5194/egusphere-egu2020-9813).
- 11 **Dreyer, J.**, E. Vigren, M. Morooka, J.-E. Wahlund, S. Buchert, and J. H. Waite (2020). “Using the effective recombination coefficient to constrain the positive ion composition in Saturn’s ionosphere”. In: *European Planetary Science Congress*, Epsc2020–451. DOI: [10.5194/epsc2020-451](https://doi.org/10.5194/epsc2020-451).