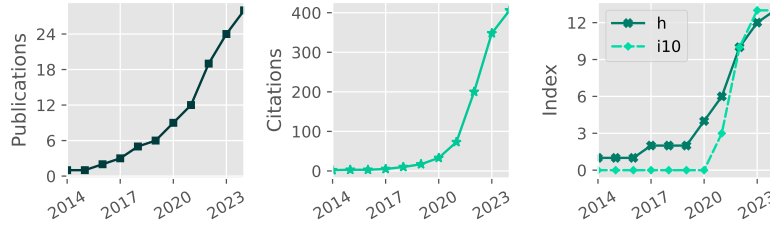


Denis Sergeev

 Pronouns: he/him/his
 University of Exeter, UK
 d.sergeev@exeter.ac.uk
 0000-0001-8832-5288
 [dennissergeev.github.io](https://github.com/dennissergeev)
 [dennissergeev](https://github.com/dennissergeev)



Total Pub. **28**
Refereed **27**
First Author **7**
Citations **406**
h-index **13**

Updated: 23 Apr 2024

About

I am fascinated by atmospheric phenomena on different planets. I am especially interested in the role of convection and clouds in planetary climates and how cloud processes affect the habitability of terrestrial exoplanets. In my research, I try to unravel the complexity of planetary atmospheres by using 3D climate models.

Academic Career

2021– Postdoctoral Research Fellow at the Department of Physics & Astronomy, **University of Exeter**
2018–2021 Postdoctoral Research Fellow at the Department of Mathematics & Statistics, **University of Exeter**
2014–2018 PhD in Meteorology at the **University of East Anglia**
Supervisors: Ian A. Renfrew, Thomas Spengler, Stephen Dorling
Thesis title (shortened): “[Characteristics of Polar Lows in the Nordic Seas](#)”
2009–2014 Specialist Diploma in Meteorology (1st class equiv.) at the **Lomonosov Moscow State University**
Supervisor: Victor Stepanenko
Thesis title: “[Idealised Numerical Modelling of Polar Mesocyclone Dynamics](#)”

Funding and Awards

Direct Funding, PI

| Year | Award | Est. Total Value |
|------|--|------------------|
| 2024 | Above & Beyond Silver Award University of Exeter | £1000 |
| 2023 | Meeting Organisation Funding (Exoclimes VI and ExoSLAM) RAS | £5000 |
| 2022 | Undergraduate Student Bursary (awarded; student declined) RAS | £1200 |
| 2017 | Best Presentation Award CEEDA Symposium | ~£100 |
| 2016 | Travel Bursary Polar Prediction School | ~£1000 |
| 2015 | Travel Award High-Latitude Dynamics workshop | ~£1000 |
| 2014 | Lord Zuckerman PhD scholarship School of Environmental Sciences, UEA | ~£112 000 |
| 2014 | Young Scientist Travel Award EGU General Assembly | ~£200 |
| 2014 | Russian Academy of Sciences Young Scientist Medal | ~£1000 |

Observational Facilities Resources

| Year | Resource | Est. In-kind Value |
|------|---|--------------------|
| 2023 | JWST: 49.21 Primary Spacecraft Hours in Cycle 2 (PI: J. Kirk) | • |

Publications

Citations

(preprints in grey)

- Zamyatina, M., Christie, D. A., Hébrard, E., Mayne, N. J., et al. (incl. **Sergeev, D. E.**), 2024, [Quenching-driven equatorial depletion and limb asymmetries in hot Jupiter atmospheres: WASP-96b example](#), MNRAS
- Mak, M. T., **Sergeev, D. E.**, Mayne, N., Banks, N., et al., 2024, [3D simulations of TRAPPIST-1e with varying CO₂, CH₄, and haze profiles](#), MNRAS
- Villanueva, G. L., Fauchez, T. J., Kofman, V., Alei, E., et al. (incl. **Sergeev, D. E.**), 2024, [Modeling Atmospheric Lines by the Exoplanet Community \(MALBEC\) Version 1.0: A CUISINES Radiative Transfer Intercomparison Project](#), Planet. Sci. J.
- Sergeev, D. E.**, Boutle, I. A., Lambert, F. H., Mayne, N. J., et al., 2024, [The impact of the explicit representation of convection on the climate of a tidally locked planet in global stretched-mesh simulations](#), arXiv:2402.19277

- 2 Mak, M. T., Mayne, N. J., **Sergeev, D. E.**, Manners, J., et al., 2023, [3D Simulations of the Archean Earth Including Photochemical Haze Profiles](#), *J. Geophys. Res.: Atmospheres*
- 4 **Sergeev, D. E.**, Mayne, N. J., Bendall, T., Boutle, I. A., et al., 2023, [Simulations of idealised 3D atmospheric flows on terrestrial planets using LFRic-Atmosphere](#), *Geosci. Model Dev.*
- 3 Cohen, M., Bollasina, M. A., **Sergeev, D. E.**, Palmer, P. I., et al., 2023, [Traveling Planetary-scale Waves Cause Cloud Variability on Tidally Locked Aquaplanets](#), *Planet. Sci. J.*
- 2 Eager-Nash, J. K., Mayne, N. J., Nicholson, A. E., Prins, J. E., et al. (incl. **Sergeev, D. E.**), 2023, [3D Climate Simulations of the Archean Find That Methane has a Strong Cooling Effect at High Concentrations](#), *J. Geophys. Res.: Atmospheres*
- 3 McCulloch, D., **Sergeev, D. E.**, Mayne, N., Bate, M., et al., 2023, [A modern-day Mars climate in the Met Office Unified Model: dry simulations](#), *Geosci. Model Dev.*
- 9 Braam, M., Palmer, P. I., Decin, L., Ridgway, R. J., et al. (incl. **Sergeev, D. E.**), 2022, [Lightning-induced chemistry on tidally-locked Earth-like exoplanets](#), *MNRAS*
- 4 Christie, D. A., Lee, E. K. H., Innes, H., Noti, P. A., et al. (incl. **Sergeev, D. E.**), 2022, [CAMEMBER: A Mini-Neptunes General Circulation Model Intercomparison, Protocol Version 1.0.A CUISINES Model Intercomparison Project](#), *Planet. Sci. J.*
- 43 **Sergeev, D. E.**, Fauchez, T. J., Turbet, M., Boutle, I. A., et al., 2022, [The TRAPPIST-1 Habitable Atmosphere Intercomparison \(THAI\). II. Moist Cases-The Two Waterworlds](#), *Planet. Sci. J.*
- 33 Fauchez, T. J., Villanueva, G. L., **Sergeev, D. E.**, Turbet, M., et al., 2022, [The TRAPPIST-1 Habitable Atmosphere Intercomparison \(THAI\). III. Simulated Observables-the Return of the Spectrum](#), *Planet. Sci. J.*
- 34 Turbet, M., Fauchez, T. J., **Sergeev, D. E.**, Boutle, I. A., et al., 2022, [The TRAPPIST-1 Habitable Atmosphere Intercomparison \(THAI\). I. Dry Cases-The Fellowship of the GCMs](#), *Planet. Sci. J.*
- 18 **Sergeev, D. E.**, Lewis, N. T., Lambert, F. H., Mayne, N. J., et al., 2022, [Bistability of the Atmospheric Circulation on TRAPPIST-1e](#), *Planet. Sci. J.*
- 8 Cohen, M., Bollasina, M. A., Palmer, P. I., **Sergeev, D. E.**, et al., 2022, [Longitudinally Asymmetric Stratospheric Oscillation on a Tidally Locked Exoplanet](#), *ApJ*
- 28 Fauchez, T. J., Turbet, M., **Sergeev, D. E.**, Mayne, N. J., et al., 2021, [TRAPPIST Habitable Atmosphere Intercomparison \(THAI\) Workshop Report](#), *Planet. Sci. J.*
- 19 Terpstra, A., Renfrew, I. A., & **Sergeev, D. E.**, 2021, [Characteristics of Cold-Air Outbreak Events and Associated Polar Mesoscale Cyclogenesis over the North Atlantic Region](#), *J. Cli.*
- 38 Renfrew, I. A., Barrell, C., Elvidge, A. D., Brooke, J. K., et al. (incl. **Sergeev, D.**), 2021, [An evaluation of surface meteorology and fluxes over the Iceland and Greenland Seas in ERA5 reanalysis: The impact of sea ice distribution](#), *Q. J. R. Meteorol. Soc.*
- 20 Eager-Nash, J. K., Reichelt, D. J., Mayne, N. J., Hugo Lambert, F., et al. (incl. **Sergeev, D. E.**), 2020, [Implications of different stellar spectra for the climate of tidally locked Earth-like exoplanets](#), *A&A*
- 50 **Sergeev, D. E.**, Lambert, F. H., Mayne, N. J., Boutle, I. A., et al., 2020, [Atmospheric Convection Plays a Key Role in the Climate of Tidally Locked Terrestrial Exoplanets: Insights from High-resolution Simulations](#), *ApJ*
- 13 Joshi, M. M., Elvidge, A. D., Wordsworth, R., & **Sergeev, D.**, 2020, [Earth's Polar Night Boundary Layer as an Analog for Dark Side Inversions on Synchronously Rotating Terrestrial Exoplanets](#), *ApJ*
- 24 Renfrew, I. A., Pickart, R. S., Våge, K., Moore, G. W. K., et al. (incl. **Sergeev, D.**), 2019, [The Iceland Greenland Seas Project](#), *BAMS*
- 13 **Sergeev, D.**, Renfrew, I. A., & Spengler, T., 2018, [Modification of Polar Low Development by Orography and Sea Ice](#), *Mon. Wea. Rev.*
- 6 Shestakova, A. A., Toropov, P. A., Stepanenko, V. M., **Sergeev, D. E.**, et al., 2018, [Observations and modelling of downslope windstorm in Novorossiysk](#), *Dyn. Atm. Ocean.*

- 20 **Sergeev, D. E.**, Renfrew, I. A., Spengler, T., & Dorling, S. R., 2017, [Structure of a shear-line polar low](#), Q. J. R. Meteorol. Soc.
- 6 Spengler, T., Renfrew, I. A., Terpstra, A., Tjernström, M., et al. (incl. **Sergeev, D.**), 2016, [High-Latitude Dynamics of Atmosphere-Ice-Ocean Interactions](#), BAMS
- 6 Eliseev, A. V., & **Sergeev, D. E.**, 2014, [Impact of subgrid-scale vegetation heterogeneity on the simulation of carbon-cycle characteristics](#), Izv. Atmos. Ocean. Phy.

Conferences

Invited Talks

- May 2024 3D simulations of exoplanet atmospheres with the next-generation Met Office model
University of Leicester | Leicester, UK
- Apr 2024 Shall I compare thee to a distant world? Inter-planet and inter-model comparative studies
EGU General Assembly | Vienna, Austria
- Jul 2023 Simulations of idealised 3D atmospheric flows on terrestrial planets using LFRic-Atmosphere
NASA GISS Seminar | Online
- Mar 2023 First results of using LFRic for exoplanet climate modelling
NIWA Seminar | Wellington, New Zealand
- Feb 2023 Atmospheric dynamics and chemistry on exoplanets
UQ Astro Group Meeting | Brisbane, Australia
- Feb 2023 [Atmospheric dynamics and chemistry on exoplanets](#)
UniSQ Exoplanet Group Seminar | Brisbane, Australia
- Feb 2023 Atmospheric dynamics and chemistry on exoplanets
UNSW AstroSeminar | Sydney, Australia
- Apr 2022 [Dichotomy of the atmospheric circulation on TRAPPIST-1e](#)
NASA GISS Seminar | Online
- Jan 2022 Dichotomy of the atmospheric circulation on TRAPPIST-1e
NASA GSFC Extrasolar Planets Seminar | Online
- Nov 2021 TRAPPIST-1 Habitable Atmosphere Intercomparison (THAI)
MPIA APEX Exocoffee | Online
- May 2021 [Overcast on TRAPPIST-1e](#)
RCC MSU Geophysical Seminar | Online
- Sep 2020 [Simulations of convection over a range of atmospheric conditions on TRAPPIST-1e](#)
THAI Workshop | Online
- Apr 2020 [Atmospheric convection plays a key role in the climate of tidally locked exoplanets](#)
University of Reading Meteorology Seminar | Online
- Apr 2020 [Atmospheric convection plays a key role in the climate of tidally locked exoplanets](#)
NASA GISS Seminar | Online

Contributed Talks

- Sep 2023 Introducing GeoVista - Cartographic rendering and mesh analytics powered by PyVista (joint talk)
Met Office Seminar | Exeter, UK
- Jul 2022 Bistability of the atmospheric circulation on TRAPPIST-1e
Rocky Worlds II | Oxford, UK
- Apr 2022 Dichotomy of the atmospheric circulation on TRAPPIST-1e
Exoplanet Modelling in the James Webb Era II: Terrestrial planets and sub-Neptunes | Online
- Nov 2020 [Explicit convection on tidally locked rocky exoplanets simulated with the UM nesting suite](#)
Unified Model users workshop | Online
- Aug 2019 [Simulations of moist convection on tidally-locked rocky exoplanets](#)
Exoclimates V | Oxford, UK
- Jun 2019 [North Atlantic polar mesoscale cyclones in ERA5 and ERA-Interim reanalyses](#)
IGP workshop | Norwich, UK
- Apr 2019 Atmospheric convection on tidally-locked Earth-like exoplanets

- Jun 2018 UK Exoplanet Community Meeting | London, UK
[Modification of Polar Low Development by Sea Ice and Svalbard Orography](#)
POLAR2018 | Davos, Switzerland
- Oct 2017 [The influence of Svalbard orography and sea ice on polar low development](#)
18th Cyclone Workshop | Sainte-Adèle, Canada
- Apr 2017 [Polar lows and how background environment can influence their development](#)
Cambridge Earth Systems Science EnvEast Doctoral Alliance Symposium | Cambridge, UK
- May 2016 Structure of the shear-line polar low south of Svalbard
NORPAN meeting | Tokyo, Japan
- Apr 2016 [Structure of the shear-line polar low south of Svalbard](#)
13th European Polar Lows Working Group Workshop | Paris, France

Poster Presentations

- Jun 2024 The impact of convection on the climate of a tidally locked planet in stretched-mesh simulations
Exoplanets 5 | Leiden, Netherlands
- Apr 2024 The impact of convection on the climate of TRAPPIST-1e in global stretched-mesh simulations
EGU General Assembly | Vienna, Austria
- Apr 2024 The impact of convection on the climate of a tidally locked planet in stretched-mesh simulations
UK Exoplanet Community Meeting | Birmingham, UK
- Nov 2022 Dry Modern-Day Mars Climate in the Met Office Unified Model
UK Solar System Planetary Atmospheres | London, UK
- Sep 2022 Bistability of the Atmospheric Circulation on TRAPPIST-1e
UK Exoplanet Community Meeting | Edinburgh, UK
- Jul 2015 Structure and dynamics of a shear-line polar low during a cold-air outbreak over the Norwegian Sea
Royal Meteorological Society Student Conference | Birmingham, UK
- Mar 2015 Structure and dynamics of a shear-line polar low during a cold-air outbreak over the Norwegian Sea
Dynamics of Atmosphere-Ice-Ocean Interactions in the High Latitudes workshop | Rosendal, Norway
- May 2014 Numerical modelling of polar mesocyclones dynamics diagnosed by the energy budget
EGU General Assembly | Vienna, Austria
- Apr 2013 Impact of subgrid-scale vegetation heterogeneity on the carbon cycle
EGU General Assembly | Vienna, Austria
- Apr 2013 Numerical modelling of polar mesocyclones generation mechanisms
EGU General Assembly | Vienna, Austria

Supervision

I am an integral member of the [Exeter Exoplanet Theory Group \(EETG\)](#), and have been actively involved in the supervision of students — both as a [lead supervisor](#) and as a co-supervisor. Undergraduate and Masters students who went on to do an MSc/PhD are marked with *.

PhD Supervision (1)

- Sep 2021–Sep 2025 Martha (Mei Ting) Mak
Project: Hazes in Planetary Atmospheres
Co-supervisors: N. J. Mayne, J. Manners, E. Hébrard

Masters Supervision (12)

- Jan 2023–May 2024 Tom Batchelor, Luke Benzing, & Alex McGinty*
Project: Mars Atmosphere Modelling
Co-supervisors: M. Bate, N. J. Mayne, D. McCulloch
- Sep 2020–Sep 2022 Danny McCulloch* (MSci by Research)
Project: Climate Modelling of Modern-Day Mars
Co-supervisors: M. Bate, N. J. Mayne
- Apr 2021–Sep 2022 Meghan Plumridge* (MSci by Research)
Project: Climate Modelling of Early Mars

- Jan 2021–May 2022 Co-supervisors: M. Bate, N. J. Mayne
Jasper Chadwick & Esse Sellwood
Project: Ocean Heat Transport on Rocky Exoplanets
- Jan 2021–May 2022 Co-supervisors: F. H. Lambert, J. Eager-Nash
Isabelle Browne & Oakley Young
Project: Greenhouse Effect on Early Mars
- Jan 2020–May 2021 Co-supervisors: F. H. Lambert, N. J. Mayne, J. Eager-Nash
Toby Ferrison
Project: Titan Climate Modelling
- Oct 2018–May 2019 Co-supervisor: F. H. Lambert
Jake Eager-Nash* & David Reichelt
Project: Implications of Stellar Type on the Climate of Tidally Locked Terrestrial Exoplanets
- Co-supervisors: F. H. Lambert, N. J. Mayne

Undergraduate and Summer Internship Supervision (8)

- Feb–Jun 2024 Milo Whale
Project: Sparse Atmospheric Modelling with the UM
Co-supervisors: M. Braam, D. McCulloch, F. H. Lambert
- Jul–Sep 2022 Oakley Young
Project: Ekman Ocean Model
Co-supervisors: J. Eager-Nash, F. H. Lambert
- Jun–Sep 2022 James McDermott* & Lottie Woods***
Project: Simulations of Lightning Storms on Tidally Locked Rocky Exoplanets
- Jun–Aug 2021 Oakley Young
Project: Climate Modelling of Archean Earth
Co-supervisors: J. Eager-Nash, N. J. Mayne
- Jun–Aug 2021 Joshua Parkin & Esse Sellwood
Project: The Impact of Host Star Spectrum on the Climate of Rocky Exoplanets
Co-supervisors: J. Eager-Nash, N. J. Mayne
- Jun–Aug 2019 Isobel Parry*
Project: Water Cycle on Proxima Centauri b
Co-supervisor: F. H. Lambert

Teaching and Mentoring

- Feb 2024 [Physics of Climate Change \(PHY2222\)](#)
Workshop lead | University of Exeter | ~30 students
- Jul 2023 [ClimateMatch Academy](#)
Mentor | Online | 3 groups of ~5 students
- Jul 2023 [International Sustainability Summer School](#)
Lecturer | University of Exeter | ~10 students
- Jun 2023 [Exoclimes Summer School in Atmospheres and Modelling \(ExoSLAM\)](#)
Co-chair & lecturer | University of Exeter | ~50 students
- Jan 2018 [ECR course “Introduction to Python in Environmental Sciences”](#)
Course creator & leader | University of East Anglia | ~50 students
- 2015–2017 Modelling Environmental Processes; Meteorology; Numerical Skills
Teaching assistant | University of East Anglia
- Apr 2017 Field Course in Meteorology
Teaching assistant | Slapton / University of East Anglia
- Nov 2016 [Python Training Course](#)
Course creator & leader | University of East Anglia | ~30 students

Academic Community

- Awards and Recognition

- Above & Beyond Award (x2) | University of Exeter, 2023
- Organisation of Scientific Meetings
 - [ExoSLAM Summer School \(Co-chair\)](#) | Exeter, Jun 2023 | ~50 attendees
 - [Exoclimes VI \(Member of LOC\)](#) | Exeter, Jun 2023 | ~200 attendees
 - Challenge of Science Leadership Short Course | Exeter, Mar 2023 | 11 attendees
 - Exeter Exoplanet Theory Group Summer Retreat | Mawgan Porth, Aug–Sep 2022 | 15 attendees
- Committees and steering groups
 - [Climates Using Interactive Suites of Intercomparisons Nested for Exoplanet Studies \(CUISINES\)](#)
- Reviewing
 - Journals: *Planet. Sci. J.*, *Geophys. Res. Lett.*, *Nat. Astron.*, *ApJ*, *Planet. Space Sci.*, *Q. J. R. Meteorol. Soc.*
 - Grants: STFC (Consolidated)
 - Facilities: JWST (Exoplanets & Disks, Cycle 3)
- Professional Memberships: Fellow of the Royal Astronomical Society, Member of the Europlanet Society

Impact and Outreach

- Press Releases
 - Joint PR from the [University of Exeter](#), [American University](#), & [INSU CNRS](#) on the THAI project
- Visualisation
 - [“Cloudy Skies of Distant Exoplanets”](#), University of Exeter Images of Research 2023
 - [“A refined look at tidally locked exoplanets”](#), DiRAC HPC Research Image Competition 2023
 - [“Exoplanetary Atmospheres”](#) at Science as Art Gallery (Exeter Science Centre)
 - [3D visualisation of dusty atmospheres for a Nature press release](#)
 - [Visualisation for the 360° VR video “Virtual Reality Exploration of Exoplanets”](#)
- Interviews
 - [UoE interview](#) about my research
 - [UKRI/STFC interview](#) about outreach
 - Featured in the [PRI podcast](#) on the IGP campaign
- Science Exhibitions
 - Expert Scientist at the [Climate Exhibition](#) (part of British Science Festival 2023)
- [STEM Ambassador](#)
- School Visits
 - Visit to Pool Academy as part of the [“Exoplanet Explorers” programme](#)
- Scientific Consulting
 - [Videogame “Exoplanet Explorers”](#) (STFC Nucleus grant “4EP”, PI N. J. Mayne)
- Blogging
 - [Disastrous Disaster Movies](#)
 - [Polar Lows: What Fuels Arctic Hurricanes?](#)
 - [Worldwide Weird Weather Words](#)
- Miscellaneous
 - [AtmosSciBot](#): Twitter bot that generates word clouds of open access publications in atmospheric sciences

Skills

| | |
|--|---|
| Languages | English (fluent), French (basic), Russian (native) |
| Numerical models | LFRic, Unified Model, SOCRATES, LAGRANTO, Isca |
| Programming languages | Python, Bash, FORTRAN, MATLAB, NCL |
| Python libraries (user) | cartopy, cython, iris, matplotlib, numpy, pandas, pyvista, xarray |
| Python libraries (creator/contributor) | aeolus, cartopy, pyvista, geovista |
| Parallel computing | Dask, MPI, OpenMP |
| Version control | Git, Subversion |
| Document preparation | L ^A T _E X, Jupyter Notebooks, Markdown, HTML, CSS, reST |

Vocational Training

| | |
|----------|---|
| Sep 2023 | Belbin Training |
| Mar 2023 | Challenge of Science Leadership |
| Dec 2022 | Interview Training |
| Jul 2020 | Writing Workshop for Climate Scientists |
| Mar 2020 | ESA JWST Master Class |
| Jul 2019 | ICTP Summer School on Convective Organization and Climate Sensitivity |
| Apr 2018 | Fortran Modernisation Workshop |
| Jan 2018 | Helicopter Underwater Escape Training Course (CA-EBS) |
| Dec 2017 | Sea Survival Course |
| Jun 2017 | Weather Presenting |
| Feb 2017 | Level 1 First Aid for Field Work Course |
| Jan 2017 | Raspberry Pi Basics |
| Apr 2016 | WWRP/WCRP/Bolin Center Polar Prediction School |
| Dec 2014 | UK Met Office Unified Model Training |

Vocational Experience

| | |
|--------------|--|
| Apr–Jun 2018 | Data Technician Processing of meteorological data collected in the IGP field campaign University of East Anglia |
| 2015–2018 | Founder and Leader Python Users Group University of East Anglia |
| Feb–Mar 2018 | Member of the Meteorology Team The Iceland-Greenland Seas Project (IGP) field campaign Akureyri, Iceland |
| Mar 2015 | Rapporteur Dynamics of Atmosphere-Ice-Ocean Interactions in the High-Latitudes Rosendal, Norway |
| Oct 2013 | Intern Geophysical Institute University of Bergen, Norway |
| Aug–Sep 2013 | Weather Forecaster Forecast and Briefing Service Main Aviation Meteorological Centre, Vnukovo Airport |
| Jul 2012 | Intern A.M. Obukhov Institute of Atmospheric Physics Moscow, Russia |