

William J. M. Seviour

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University of Exeter	CV updated: 17 th March, 2022

Education

2011–2015 DPhil, **University of Oxford**, UK
Department of Atmospheric, Oceanic, and Planetary Physics (AOPP)
Supervisors: Lesley J. Gray (AOPP), Steven C. Hardiman (Met Office)
Thesis: Variability of the polar stratosphere and its influence on surface weather and climate

2007–2011 MA & MSci, **University of Cambridge**, UK
Experimental and Theoretical Physics

Research experience

2020– Senior Lecturer, **University of Exeter**, UK
Department of Mathematics and Global Systems Institute

2020– Honorary Senior Lecturer, **University of Bristol**, UK
School of Geographical Sciences

2018–2020 Vice-Chancellor’s Research Fellow, **University of Bristol**, UK
School of Geographical Sciences

2015–2018 Postdoctoral Fellow, **Johns Hopkins University**, MD, USA
Department of Earth and Planetary Sciences

2010 Undergraduate Studentship, **Met Office Hadley Centre**, UK
Atmospheric Composition and Climate Group

Research grants and awards

2020–2023 **NERC Highlight Topic Grant** (£1.8M, Co-I, PI: James Screen)
Consequences of Arctic Warming for European Climate and Extreme Weather (ArctiCONNECT)

2018–2022 **University of Bristol**
Vice-Chancellor’s Fellowship (£~300k)
The coupled dynamics of Southern Ocean climate change

2018–2020 **European Union/European Commission**
(offered) Marie Skłodowska Curie Individual Fellowship (£162k)
The coupled dynamics of Southern Ocean climate change
(Declined due to incompatibility with VC Fellowship above)

2011–2014 **Met Office Hadley Centre**
Collaborative Awards in Science and Engineering (CASE) graduate studentship (£6k)
Seasonal prediction of the stratospheric polar vortex and stratospheric ozone

2012, 2014 **World Climate Research Programme**
Awards for conference travel (£1.3k)

Research interests

Global climate change, atmospheric circulation, polar climate, middle atmosphere dynamics, atmosphere-ocean interaction, sea ice, extreme weather events, geophysical fluid dynamics, planetary atmospheres

Invited presentations and seminars

Atmospheric, Oceanic, and Planetary Physics, University of Oxford, 2022.
Department of Earth and Planetary Sciences, Yale University, 2021.

Department of Meteorology, University of Reading, UK. 2020.

Met Office Hadley Centre, UK. 2019.

Centre for Geophysical and Astrophysical Fluid Dynamics, University of Exeter, UK. 2019.

JHU Applied Physics Laboratory, MD, USA. 2017.

NASA Goddard Space Flight Center, MD, USA. 2015.

Department of Applied Physics and Applied Mathematics, Columbia University, NY, USA. 2015.

Center for Environmental and Applied Fluid Mechanics, Johns Hopkins University, MD, USA. 2015.

Met Office Hadley Centre, UK. 2014.

Selected conference presentations

The transient impact of ozone depletion on the ocean: sea surface temperature, heat content, and carbon, AMS Annual Meeting, Phoenix, AZ, USA. 2019.

The Transient Response of Antarctic Sea Surface Temperature and Sea Ice to Ozone Depletion, AGU Ocean Sciences Meeting, Portland, OR, USA. 2018.

Large uncertainty in the relative rates of dynamical and hydrological tropical expansion, AGU Fall Meeting, New Orleans, LA, USA. 2017.

The Stability of Mars' Annular Polar Vortex, AMS Conference on Atmospheric and Oceanic Fluid Dynamics, Portland, OR, USA. 2017.

Weakening and Shift of the Arctic Stratospheric Polar Vortex: Internal Variability or Forced Response?, AMS Conference on Middle Atmosphere, Portland, OR, USA. 2017.

A Two-Time Scale Response of the Southern Ocean to Ozone Depletion: Regional Responses and Physical Mechanisms, AGU Fall Meeting, San Francisco, CA, USA. 2016

Robustness of the simulated tropospheric response to ozone depletion, Quadrennial Ozone Symposium, Edinburgh, UK. 2016.

The transient response of the Southern Ocean to ozone depletion, AGU Ocean Sciences Meeting, New Orleans, LA, USA. 2016.

Stratospheric polar vortex splits and displacements in the CMIP5 models, AMS Conference on Atmospheric and Oceanic Fluid Dynamics, Minneapolis, MN, USA. 2015.

Skillful seasonal prediction of the Southern Annular Mode and Antarctic Ozone, AMS General Assembly, Phoenix, AZ, USA. 2015.

A practical method to identify stratospheric polar vortex displacements and splits, SPARC General Assembly, Queenstown, New Zealand. 2014.

The role of the stratosphere in seasonal prediction, Royal Meteorological Society Student Conference, Manchester, UK. 2014.

A practical method to identify stratospheric polar vortex displacements and splits, DynVar/SNAP Workshop, Reading, UK. 2014.

The Brewer-Dobson circulation inferred from ERA-Interim, SPARC Workshop on the Brewer-Dobson circulation, Grindelwald, Switzerland. 2012.

Research student supervision

PhD students:

Erin Walker (2018–present; co-supervised with Dann Mitchell and Mat Collins)

Emily Ball (2019–present; co-supervised with Dann Mitchell and Geoff Vallis)

Jing Jin (2019–present; co-supervised with Tony Payne)

Ross Castle (2020–present; co-supervised with Geoff Vallis)

Dan Williams (2020–present; co-supervised with Stephen Thomson and Geoff Vallis)

Regan Mudhar (2021-present; co-supervised with Stephen Thomson, James Screen, and Adam Scaife)

MSci (Physics): Regan Mudhar (2018–2019; co-supervised with Dann Mitchell and Zoe Leinhardt), Matthew Elsham (2019–2020; co-supervised with Zoe Leinhardt), Konrad Kielan (2019–2020; co-supervised with Zoe Leinhardt), Rhian Wade (2019–2020; co-supervised with Zoe Leinhardt), Sanjee Panditharatne (2019–2020; co-supervised with Zoe Leinhardt).

MSc (Climate Change Science and Policy): Ryan Bedford (2019), Joshua Cooper-Thorne (2019; co-supervised with Dann Mitchell).

Teaching

Co-lead MTHM019 (with Stephen Thomson), Fluid Dynamics of Atmospheres and Oceans (Masters'-level course), University of Exeter, 2020.

Tutor MTH1002, Mathematical Methods, University of Exeter, 2021

Leader of 'Micrometeorology' practical (3.5 days), first-year Geography Dartmoor field trip, University of Bristol, 2019.

Co-developer and instructor for 'Create your own planet', first-year Geography climate modelling practical (170 students), University of Bristol, 2018.

Guest lecturer (2 lectures) for 'Present and Future Climate' (300-level course), Johns Hopkins University, 2017.

Organiser of Software Carpentry computing workshop at Johns Hopkins University, Department of Earth and Planetary Sciences, 2015 and 2016.

Lecturer (3 lectures) for 'Introduction to Climate Change', Osher Lifelong Learning Institute, Johns Hopkins University, 2016.

Guest lecturer (2 lectures) for 'Introduction to Oceans and Atmospheres' (200-level course), Johns Hopkins University, 2016.

Tutor for 'Flows, Fluctuations, and Complexity' (3rd year Physics), Hertford College, University of Oxford, 2012–2013.

Professional service

Invited review panel member, NASA Solar System Workings, Atmospheric Structure and Dynamics, 2019.

Proposal reviewer for Science and Technology Facilities Council (STFC), Israel Science Foundation, Deutsche Forschungsgemeinschaft.

Convener of Atmospheres & Oceans Seminar Series at Johns Hopkins University, Department of Earth and Planetary Sciences, 2015–2016.

Reviewer for AGU Books, Atmospheric Chemistry and Physics, Atmospheric Environment, Climate Dynamics, Earth System Science Data, Geophysical Research Letters, Journal of the Atmospheric Sciences, Journal of Geophysical Research, Journal of the Meteorological Society of Japan, Nature Climate Change, Proceedings of the National Academy of Sciences, Quarterly Journal of the Royal Meteorological Society.

Organising Committee Member, Royal Meteorological Society Student Conference, 2013.

Selected to participate in National Centre for Atmospheric Science Climate Modelling Summer School, University of Oxford, 2013.

Member of the Royal Meteorological Society, American Meteorological Society, and American Geophysical Union.

Software

vortex-moments (Primary developer): Python package for calculating geometrical diagnostics of polar vortices in Earth and planetary atmospheres (<https://github.com/wseviour/vortex-moments>).

Contributor to: matplotlib (Python plotting library), isca (idealised planetary atmosphere simulation framework).

List of publications

Supervised PhD students and postdocs are underlined.

Publications in review

- 25 Hall, R. J., D. M. Mitchell, W. J. M. Seviour, and C. J. Wright. How well are Sudden Stratospheric Warming surface impacts captured in in CMIP6 climate models?

Refereed publications

- 24 Wright, C. J., R. J. Hall, T. M. Banyard, N. P. Hindley, D. M. Mitchell, and **W. J. M. Seviour**. Dynamical and Surface Impacts of the January 2021 Sudden Stratospheric Warming in Novel Aelous Wind Observations, MLS, and ERA5. *Weather and Climate Dynamics*, in press.
- 23 Polvani, L. M., A. Banerjee, R. Chemke, E. W. Doddridge, D. Ferreira, A. Gnanadesikan, Y. Kostov, J. Marshall, **W. J. M. Seviour**, S. Solomon, and D. W. Waugh (2021). Interannual SAM modulation of Antarctic sea ice extent does not account for its long-term trends: Implications for the role of ozone depletion. *Geophys. Res. Lett.*, 48, e2021GL094871, doi:10.1029/2021GL094871.
- 22 Mitchell, D. M., R. K. Scott, **W. J. M. Seviour**, S. I. Thompson, D. W. Waugh, N. A. Teanby, E. R. Ball. Polar Vortices in Planetary Atmospheres. *Rev. Geophys.*, in press.
- 21 Ball, E. R., D. M. Mitchell, **W. J. M. Seviour**, S. I. Thomson, G. K. Vallis (2021). The roles of latent heating and dust in the structure and variability of the northern Martian polar vortex. *Planet Sci. J.*, 203, doi:10.3847/psj/ac1ba2.
- 20 Hall, R. J., D. M. Mitchell, **W. J. M. Seviour**, and C. J. Wright (2021). Persistent model biases in the CMIP6 representation of stratospheric polar vortex variability, *J. Geophys Res.*, 126, e2021JD034759. doi:10.1029/2021JD034759.
- 19 Hall, R. J., D. M. Mitchell, **W. J. M. Seviour**, and C. J. Wright (2021). Tracking the stratosphere-to-surface impact of Sudden Stratospheric Warmings, *J. Geophys. Res.*, 126. doi:10.1029/2020JD033881.
- 18 Sharkey, J., N. A. Teanby, M. Sylvestre, D. M. Mitchell, **W. J. M. Seviour**, C. A. Nixon, and P. G. J. Irwin (2021). Potential Vorticity structure of Titan's Polar Vortices from Cassini CIRS Observations, *Icarus*, 354, 114030, doi:10.1016/j.icarus.2020.114030.
- 17 Walker, E., D. M. Mitchell, and **W. J. M. Seviour** (2020). The numerous approaches to tracking extratropical cyclones and the challenges they present, *Weather*, 75, 336–341.
- 16 Mitchell, D. M., Y. T. E. Lo, **W. J. M. Seviour**, L. Haimberger, and L. M. Polvani (2020). The vertical profile of recent tropical temperature trends: Persistent model biases in the context of internal variability, *Environ. Res. Lett.*, 15, 1040b4, doi:10.1088/1748-9326/ab9af7.
- 15 Scott, R. K., **W. J. M. Seviour**, D. W. Waugh (2020). Forcing of the Martian polar annulus by Hadley cell transport and latent heating. *Q. J. R. Meteorol. Soc.*, 146, 2174–2190, doi:10.1002/qj.3786.
- 14 Sharkey, J., N. A. Teanby, M. Sylvestre, D. M. Mitchell, **W. J. M. Seviour**, C. A. Nixon, P. G. J. Irwin (2020). Mapping the Zonal Structure of Titan's Northern Polar Vortex, *Icarus*, 337, 113441, doi:10.1016/j.icarus.2019.113441

- 13 **Seviour, W. J. M.**, F. Codron, E. W. Doddridge, D. Ferreira, A. Gnanadesikan, M. Kelley, Y. Kostov, J. Marshall, L. M. Polvani, J. L. Thomas, D. W. Waugh (2019). The Southern Ocean sea surface temperature response to ozone depletion: A multi-model comparison, *J. Climate*, *32*, 5107–5121, doi:10.1175/JCLI-D-19-0109.1.
- 12 Waugh, D. W., K. M. Grise, **W. J. M. Seviour**, S. M. Davis, N. Davis, O. Adam, S.-W. Son, I. R. Simpson, P. W. Staten, A. C. Maycock, C. C. Ummenhofer, T. Birner, and A. Ming (2018). Revisiting the Relationship among Metrics of Tropical Expansion, *J. Climate*, *31*, 7565–7581, doi:10.1175/JCLI-D-18-0108.1.
- 11 **Seviour, W. J. M.**, S. M. Davis, K. M. Grise, and D. W. Waugh (2018). Large uncertainty in the relative rates of dynamical and hydrological tropical expansion, *Geophys. Res. Lett.*, *45*, 1106–1113, doi:10.1002/2017GL076335.
- 10 Gnanadesikan, A., A. A. Scott, M.-A. Pradal, **W. J. M. Seviour**, and D. W. Waugh (2017). Regional responses to black carbon aerosols: The importance of air-sea interaction, *J. Geophys. Res.*, doi:10.1002/2017JD027589.
- 9 **Seviour, W. J. M.** (2017) Weakening and shift of the Arctic stratospheric polar vortex: Internal variability or forced response?, *Geophys. Res. Lett.*, *44*, 3365–3373. doi:10.1002/2017GL073071.
- 8 **Seviour, W. J. M.**, D. W. Waugh, and R. K. Scott (2017). The Stability of Mars' Annular Polar Vortex, *J. Atmos. Sci.*, *74*, 1533–1547. doi:10.1175/JAS-D-16-0293.1.
- 7 **Seviour, W. J. M.**, D. W. Waugh, L. M. Polvani, G. J. P. Correa, and C. I. Garfinkel (2017) Robustness of the simulated tropospheric response to ozone depletion, *J. Climate*, *30*, 2577–2585. doi:10.1175/JCLI-D-16-0817.1.
- 6 **Seviour, W. J. M.**, A. Gnanadesikan, D. W. Waugh, and M.-A. Pradal (2017). Transient response of the Southern Ocean to changing ozone: Regional responses and physical mechanisms, *J. Climate*, *30*, 2463–2480. doi:10.1175/JCLI-D-16-0474.1.
- 5 **Seviour, W. J. M.**, A. Gnanadesikan, and D. W. Waugh (2016). The Transient Response of the Southern Ocean to Stratospheric Ozone Depletion, *J. Climate*, *29*, 7383–7396. doi:10.1175/JCLI-D-16-0198.1.
- 4 **Seviour, W. J. M.**, L. J. Gray, and D. M. Mitchell (2016). Stratospheric polar vortex splits and displacements in the high-top CMIP5 climate models, *J. Geophys. Res.*, *121*, 1400–1413. doi:10.1002/2015JD024178.
- 3 **Seviour, W. J. M.**, S. C. Hardiman, L. J. Gray, N. Butchart, C. MacLachlan and A. A. Scaife (2014). Skillful seasonal prediction of the Southern Annular Mode and Antarctic Ozone, *J. Climate*, *27*, 7462–7474. doi:10.1175/JCLI-D-14-00264.
- 2 **Seviour, W. J. M.**, D. M. Mitchell, and L. J. Gray (2013), A practical method to identify displaced and split stratospheric polar vortex events, *Geophys. Res. Lett.*, *40*, 5268–5273. doi:10.1002/grl.50927.
- 1 **Seviour, W. J. M.**, N. Butchart and S. C. Hardiman (2012), The Brewer-Dobson circulation inferred from ERA-Interim, *Q. J. R. Meteorol. Soc.*, *138*, 878–888. doi:10.1002/qj.966.

Other publications

Contributor to World Meteorological Organization, Scientific Assessment of Ozone Depletion, (Chapter 5: Stratospheric ozone changes and climate), 2018.

Seviour, W. J. M., (2014), Variability of the polar stratosphere and its influence on surface weather and climate, D.Phil. Thesis.

Contributor to World Meteorological Organization, Scientific Assessment of Ozone Depletion, (Chapter 2: Update on Global Ozone: Past, Present, and Future), 2014.

Butler, A. H., E. P. Gerber, D. M. Mitchell and **W. J. M. Seviour** (2014), New Efforts to Update the Standard Definition of Sudden Stratospheric Warmings, Stratosphere-troposphere Processes and their Role in Climate (SPARC) Newsletter, *No. 43, July 2014*.

Orbe, C. H. Garny and **W. J. M. Seviour** (2013), SPARC Workshop on the Brewer-Dobson Circulation, 25–29 June 2012, Grindelwald, Switzerland, Stratosphere-troposphere Processes and their Role in Climate (SPARC) Newsletter, *No. 40, January 2013*.