

Alexander J. Baker, PhD

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Current position

**National Centre for Atmospheric Science
Department of Meteorology, University of Reading**

March 2016 – present

Research Scientist

Project Manager for *Huracán* (NERC Large Grant)

Projects

<i>REPRESA</i> : Tropical cyclone risk in southern Africa	2024–2025
<i>Huracán</i> : Hurricane Risk Amplification and Changing North Atlantic Natural Disasters	2023–2026
<i>nextGEMS</i> : Tropical cyclones in storm-resolving global climate models	2022–2023
<i>ACSIS</i> : North Atlantic extratropical cyclone risk	2020–2021
<i>BP-Trinidad</i> : Tropical cyclone risk in the Trinidad oil field region	2018–2020
<i>PRIMAVERA</i> : North Atlantic hydroclimatic extremes and their drivers	2016–2020

Research interests

- Tropical and midlatitude cyclones, and extratropical transition
- Cyclone development, air-sea interactions, and evolution
- North Atlantic climate variability and extremes
- Global climate model evaluation and the role of model resolution
- Atmospheric circulation, jet streams
- Hazardous weather impacts and climate risk assessment
- Stable water isotopes and palaeoclimate reconstruction

Career

Institute for Atmospheric and Climate Science, ETH Zürich

February – March 2014

Research visitor: Asian Monsoon rainfall oxygen isotope systematics

August – September 2012

Research visitor: Asian Monsoon atmospheric moisture transport and rainfall

Department of Earth Sciences, University of Durham

January 2011 – June 2015

Sir Kingsley Dunham Ph.D. Studentship

Thesis: '*Lagrangian modelling of precipitation and speleothem proxy oxygen isotope systematics in the East Asian Summer Monsoon region*'

Supervisor: Prof. James U. L. Baldini

October 2009 – September 2010

M.Sc. Geological Sciences

Thesis: '*Modelling the growth rate and oxygen isotope composition of stalagmite calcite: influence of cave ventilation and isotopic fractionation processes through Earth's hydrosphere*'

Supervisor: Prof. James U. L. Baldini

St Mary's College, University of Durham

October 2006 – June 2009

B.Sc. (Hons) Geology. 2i.

Dissertation: '*Report on geological fieldwork at Torver High Common, near Coniston, English Lake District*'

Supervisor: Dr Howard A. Armstrong

Experience

Research skills

- Linux environment (~10 years' experience) and use of batch-computing clusters (JASMIN and Levante)
- Coding in Python, R, Matlab, and use of climate-specific tools (e.g., cdo, nco)
- Advanced analysis (e.g., cyclone-tracking algorithms and analysis of cyclone environments)
- Managing and analysing climate model output and observational datasets, and proficiency with data standards (e.g., NetCDF4, GRIB2)
- Developing scientific collaboration and research coordination, including project management
- Manuscript preparation for publication
- Scientific writing for non-specialist audiences

Professional training

- Research Project Management (NCAS / University of Reading, 16th June 2022).
- Unified Model Introduction (NCAS / University of Reading, 7th–9th November 2018).
- Networking for Research Staff (University of Reading, 23rd June 2016).

Additional research and laboratory training

- Laboratory training in micromilling and introduction to ICP-mass spectrometry (University of Durham), 3rd–6th March 2015.
- Isotope Forward Modelling Workshop (University of Melbourne), 2nd October 2014.
- Collaborator, *HURRICANE Project* (University of Durham), October 2010 – June 2013.
- Terrestrial LiDAR and hydrological modelling for a commercial environmental restoration project, September – December 2010.

Supervision

- Dr Leo Saffin (PDRA, University of Reading)
July 2023 – February 2026
Midlatitude processes and interactions for North Atlantic cyclones of tropical origin
- Elliott Sainsbury (Ph.D., University of Reading)
October 2019 – September 2022 (*viva voce* examination completed December 2022)
Thesis: *The importance of post-tropical cyclones for extreme European weather*

Teaching experience

Postgraduate / postdoctoral (2016–)

- NCAS Climate Modelling Summer School (biennial): demonstrator and co-organiser, 2021 (virtual), 2019 (University of Cambridge), and 2017 (University of Cambridge).
- 3rd European Earth System and Climate Modelling School: demonstrator, 10th–21st June 2016 (University of Helsinki).

Undergraduate (2010–2013)

- Certified demonstrating training and 3 years' experience in undergraduate climate science and palaeobiology practical classes and research project supervision.
- Led fieldwork in Utah, USA (MSci level; nominated for an 'Excellence in Demonstrating' award), Cyprus (BSc level), and the English Lake District (BSc level), each including student assessment.

Secondary and further education (2009)

- Assistant KS3 physics and AS-Level Critical Thinking teacher in Staindrop School, County Durham (National Student Associates Scheme).

Professional activities

Research administration

- Website administrator for:
 - High-Resolution Climate Modelling (HRCM; University of Reading–Met Office long-term collaboration; hrcm.ceda.ac.uk)
 - Huracán project (NERC Large Grant; research.reading.ac.uk/huracan)
 - MetTC group (University of Reading; research.reading.ac.uk/tropical-cyclones).
- Organiser for fortnightly HRCM and bimonthly MetTC group meetings / seminars.
- House, Health and Safety Representative on the School of Mathematical, Physical and Computational Sciences' Research Staff Forum at the University of Reading.

Peer review

Journals | *Nature*; *Nature Geoscience*; *Nature Climate Change*; [Geophysical Research Letters](#); *Nature Communications*; *Nature Scientific Reports*; *Hydrological Processes*; *Weather*; *Geochemistry*, *Geophysics*, *Geosystems*; *Geochimica et Cosmochimica Acta*

Grants | University of Wisconsin–Milwaukee Discovery and Innovation Grant

Reports | International Panel on Climate Change (IPCC) *Sixth Assessment Report (AR6) Climate Change 2021: The Physical Science Basis* (Working Group I, Second Order Draft)

Professional memberships

Associate Fellow, Royal Meteorological Society
Member, European Geophysical Union

Fellow, Geological Society of London (FGS)

Awards

2020 University of Reading Celebrating Success

(University of Reading)

2018 Legacies Fund

(Royal Meteorological Society)

2017 Researcher Travel Grant

(University of Reading)

2010 Young Researcher of the Year

(British Cave Research Association)

2009 Margaret Fergusson Travel Scholarship

(St Mary's College, Durham)

2008 Irene Calvert Travel Bursary

(St Mary's College, Durham)

Additional HE experience

School of Biological and Chemical Sciences, Queen Mary, University of London

October 2015 – February 2016

Admissions Administrator

Key responsibilities:

- Data analysis to inform revision of School's undergraduate entry requirements.
- Co-designed a process with senior academic staff to simplify future admissions data analysis.
- Organiser for College-wide and School open days.
- Maintaining register of undergraduate applications and handling of confidential student application data.

Referees

Prof. Pier Luigi Vidale (line manager)

Department of Meteorology, University of Reading, Whiteknights, Reading, Berkshire RG6 6ES, UK

p.l.vidale@reading.ac.uk

Dr Kevin I. Hodges (frequent collaborator)

Department of Meteorology, University of Reading, Whiteknights, Reading, Berkshire RG6 6ES, UK

k.i.hodges@reading.ac.uk

Prof. James U. L. Baldini (Ph.D. supervisor)

Department of Earth Sciences, University of Durham, Science Laboratories, South Road, Durham DH1 3LS, UK

james.baldini@durham.ac.uk

Appendix 1 | Publications

citations: 518
h-index: 10

 [researchgate.net/profile/Alexander-Baker-4](https://www.researchgate.net/profile/Alexander-Baker-4)
 orcid.org/0000-0003-2697-1350

Under review & in preparation

Baker, A. J., Vidale, P. L., Athanasiadis, P., Roberts, M. J., Seddon, J., Schiemann, R. K. H., Caron, L.-P., Putrasahan, D. A., Senan, R., Terray, L., and Sutton, R. T. Future change of North Atlantic jets and extratropical cyclones in high-resolution, fully coupled global climate models. In prep., *Geophysical Research Letters*.

Lockwood, J., Athanasiadis, P., **Baker, A. J.**, Guentchev, G., Priestley, M., Roberts, M. J., Vidale, P. L., and Zappa, G. The effect of increased horizontal resolution on northern hemisphere winter storm tracks in PRIMAVERA coupled and atmosphere only historical simulations. In prep.

Baker, A. J., Roberts, M. J., Vidale, P. L., Seddon, J., Lockwood, J., and Sutton, R. T. Extratropical cyclone frequency projections are sensitive to global climate model resolution. In prep., *Geophysical Research Letters*.

Baker, A. J., Vidale, P. L., and Vanni re, B. On tropical cyclones simulated in fully coupled global storm-resolving climate models. In prep.

Baker, A. J., Gibson, R., Jones, O., Bhatia, K. T., Hodges, K. I., Bronselaer, B., Coffey, C., and Vidale, P. L. Physical and statistical tropical cyclone risk assessments using global climate models: case studies of the Trinidad and Gulf of Mexico hydrocarbon-producing regions. In prep., *Atmospheric Science Letters*.

Vanni re, B., Roberts, M. J., Hodges, K. I., Vidale, P. L., Camargo, S., **Baker, A. J.**, and Feng, X. Reconciling future projections of TC frequency in GCMs. In prep.

2023

Huang, H., Collins, W. D., Patricola, C. M., Ruprich-Robert, Y., Ullrich, P. A., and **Baker, A. J.** Contrasting Responses of Atlantic and Pacific Tropical Cyclone Activity to Atlantic Multidecadal Variability. *Geophysical Research Letters* **50**, e2023GL102959.

2022

Athanasiadis, P., Ogawa, F., Schiemann, R. K. H., **Baker, A. J.**, Bellucci, A., Ruggieri, P., Haarsma, R. J., Vidale, P. L., Omani, N.-E., Novak, L., and Gualdi, S., 2022. [Mitigating climate biases in mid-latitude North Atlantic via increasing model resolution: SST gradients and their relation to blocking and the jet](#). *Journal of Climate*.

Baker, A. J., Roberts, M. J., Vidale, P. L., Hodges, K. I., J., Seddon, J., Vanni re, B., Haarsma, R. J., Schiemann, R., Kapetanakis, D., Tourigny, E., Lohmann, K., Roberts, C. D., and Terray, L., 2022. [Extratropical transition of tropical cyclones in a multi-resolution ensemble of atmosphere-land-only and fully coupled global climate models](#). *Journal of Climate* **35**, 5283–5306.

Baker, A. J., 2022. [Tropical cyclones: Global decline in frequency](#). *Nature Climate Change* **12**, 615–617.

Bhatia, K. T., **Baker, A. J.**, Yang, W., Vecchi, G., Knutson, T., Murakami, H., Kossin, J., Hodges, K. I., Dixon, K., Bronselaer, B., and Whitlock, C., 2022. [A potential explanation for the global increase in tropical cyclone rapid intensification](#). *Nature Communications* **13**, 6626.

Sainsbury, E. M., Schiemann, R. K. H., Hodges, K. I., **Baker, A. J.**, Shaffrey, L. C., Bhatia, K. T., 2022. [What Governs the Interannual Variability of Recurring North Atlantic Tropical Cyclones?](#) *Journal of Climate* **35**, 3627–3641.

Sainsbury, E. M., Schiemann, R. K. H., Hodges, K. I., **Baker, A. J.**, Shaffrey, L. C., and Bhatia, K. T., 2022. [Why Do Some Recurring Tropical Cyclones Impact Europe?](#) *Monthly Weather Review* **150**, 2553–2571.

Sainsbury, E. M., Schiemann, R. K. H., Hodges, K. I., **Baker, A. J.**, Shaffrey, L. C., Bhatia, K. T., and Bourdin, S. [Can low-resolution CMIP6 ScenarioMIP models provide insight into future European Post-Tropical Cyclone risk?](#) *Weather and Climate Dynamics*.

2021

Baker, A. J., Hodges, K. I., Schiemann, R., and Vidale, P. L., 2021. [Historical Variability and Lifecycles of North Atlantic Midlatitude Cyclones Originating in the Tropics](#). *Journal of Geophysical Research: Atmospheres* **126**, e2020JD033924.

Baldini, J. U. L., Lechleitner, F. A., Breitenbach, S. F. M., van Hunen, J., Baldini, L. M., Wynn, P. M., Jamieson, R. A., Ridley, H. E., **Baker, A. J.**, Walczak, I. W., and Fohlmeister, J., 2021. [Detecting and quantifying palaeoseasonality in stalagmites using geochemical and modelling approaches](#). *Quaternary Science Reviews* **254**, 106784.

2020

Sainsbury, E. M., Schiemann, R. K. H., Hodges, K. I., Shaffrey, L. C., **Baker, A. J.**, and Bhatia, K. T., 2020. [How important are Post-Tropical Cyclones to European Windstorm Risk?](#) *Geophysical Research Letters* **47**, e2020GL089853.

Bador, M., Boé, J., Terray, L., Alexander, L. V., **Baker, A. J.**, Bellucci, A., Haarsma, R., Koenigk, T., Moine, M.-P., Lohmann, K., Putrasahan, D. A., Roberts, C., Roberts, M., Scoccimarro, E., Schiemann, R., Seddon, J., Senan, R., Valcke, S., and Vannière, B., 2020. [Impact of higher spatial atmospheric resolution on precipitation extremes over land in global climate models.](#) *Journal of Geophysical Research: Atmospheres* **125**, e2019JD032184.

Fabiano, F., Christensen, H. M., Strommen, K., Athanasiadis, P., **Baker, A. J.**, Schiemann, R., and Corti, S., 2020. [Euro-Atlantic weather regimes in the PRIMAVERA coupled climate simulations: impact of resolution and mean state biases on model performance.](#) *Climate Dynamics* **54**, 5031–5048.

2019

Baker, A. J., Schiemann, R., Hodges, K. I., Demory, M.-E., Mizielinski, M. S., Roberts, M. J., Shaffrey, L. C., Strachan, J., and Vidale, P. L., 2019. [Enhanced climate change response of wintertime North Atlantic circulation, cyclonic activity and precipitation in a 25-km-resolution global atmospheric model.](#) *Journal of Climate* **32**, 7763–7781.

Roberts, M. J., **Baker, A. J.**, Blockley, E. W., Calvert, D., Coward, A., Hewitt, H. T., Jackson, L. C., Kuhlbrodt, T., Mathiot, P., Roberts, C. D., Schiemann, R., Seddon, J., Vannière, B., and Vidale, P. L., 2019. [Description of the resolution hierarchy of the global coupled HadGEM3-GC3.1 model as used in CMIP6 HighResMIP experiments.](#) *Geoscientific Model Development* **12**, 4999–5028.

2015–2009

Baker, A. J., Sodemann, H., Baldini, J. U. L., Breitenbach, S. F. M., Johnson, K. R., van Hunen, J., and Zhang, P., 2015. [Seasonality of westerly moisture transport in the East Asian summer monsoon and its implications for interpreting precipitation \$\delta^{18}\text{O}\$.](#) *Journal of Geophysical Research: Atmospheres* **120**, 5850–5862.

Baker, A. J., Matthey, D. P., and Baldini, J. U. L., 2014. [Reconstructing modern stalagmite growth from cave monitoring, local meteorology, and experimental measurements of dripwater films.](#) *Earth and Planetary Science Letters* **392**, 239–249.

Baker, A. J., 2011. [Report on the 22nd British Cave Research Association Cave Science Symposium.](#) *Speleology* **18**, 28–30. [Invited]

Baker, A. J., 2011. [Analysis of geological structures and hydrological drainage characteristics at Washpool Craggs Quarry \(Weardale, UK\) based on a digital outcrop model and regional climate data.](#) One North East Studentship fieldwork and research report, Department of Earth Sciences, University of Durham.

Whitaker, T., Jones, D., Baldini, J. U. L., and **Baker, A. J.**, 2009. [A high-resolution spatial survey of cave air carbon dioxide concentrations in Scoska Cave \(North Yorkshire, UK\): implications for calcite deposition and re-dissolution.](#) *Cave and Karst Science* **36**, 85–92.

Appendix 2 | Conference contributions

Only first-author presentations are listed.

2022

Baker, A. J., Vidale, P. L., Hodges, K., Roberts, M. J., and Sutton, R. Historical and future North Atlantic extratropical cyclone activity in HighResMIP simulations. ACSIS Final Science Meeting, Oxford (2022).

Baker, A. J., Vidale, P. L., Roberts, M. J., Hodges, K., Seddon, J., Tourigny, E., Lohmann, K., Roberts, C. D., and Terray, L. [Impact of Atlantic multidecadal variability on North Atlantic tropical cyclones and extratropical transition](#). European Geophysical Union General Assembly, Vienna (2022). *EGU Sphere*, EGU22-2314.

Baker, A.J., Hodges, K.I., and Vidale, P.L. Historical variability and landfall characteristics of North Atlantic post-tropical cyclones. Symposium on Hurricane Risk in a Changing Climate, Key Largo (2022).

2021

Baker, A. J., Vidale, P. L., Hodges, K., Roberts, M. J., Hodson, D., and Lohmann, K. Impact of Atlantic multidecadal variability on North Atlantic tropical cyclones and extratropical transition in coupled global climate models. American Geophysical Union Fall Meeting, virtual (2021).

Baker, A. J., Hodges, K., Schiemann, R., and Vidale, P. L. Historical variability and landfall characteristics of North Atlantic post-tropical cyclones. American Meteorological Society 34th Conference on Hurricanes and Tropical Meteorology, virtual (2021).

Baker, A. J., Hodges, K., Schiemann, R., and Vidale, P. L. Historical variability and lifecycles of North Atlantic midlatitude cyclones originating in the tropics. Atmospheric Science Conference, virtual (2021).

2020

Baker, A. J., Hodges, K., Roberts, M., Haarsma, R., Kapetanakis, D., Seddon, J., Schiemann, R., Doblas-Reyes, F., Lohmann, K., Roberts, C. D., Terray, L., Bellucci, A., and Vidale, P. L. Extratropical transition of tropical cyclones in global climate models. American Geophysical Union Fall Meeting, virtual (2020).

2019

Baker, A. J., Hodges, K., Schiemann, R., and Vidale, P. L. North Atlantic post-tropical cyclones in reanalyses. American Geophysical Union Fall Meeting, San Francisco (2019).

Baker, A. J., Hodges, K., Haarsma, R., Schiemann, R., and Vidale, P. L. North Atlantic Post-Tropical Cyclones in Reanalysis Datasets. Atmospheric Science Conference, University of Birmingham (2019).

Baker, A. J., Hodges, K., Haarsma, R., Schiemann, R., and Vidale, P. L. [North Atlantic post-tropical cyclones in reanalysis datasets](#). European Geoscience Union 16th General Assembly, Vienna (2019). *Geophysical Research Abstracts* **21**, 16151.

2018

Baker, A. J., Schiemann, R., Hodges, K., Roberts, M. L., and Vidale, P. L. Extratropical cyclones and extreme precipitation in high-resolution global climate models. 8th GEWEX Open Science Conference: Extremes and Water on the Edge, Canmore, Canada (2018).

Baker, A. J., Hodges, K., Schiemann, R., Roberts, M. L., and Vidale, P. L. [Extratropical cyclones and extreme precipitation in high-resolution global climate models](#). European Geoscience Union 15th General Assembly, Vienna (2018). *Geophysical Research Abstracts* **20**, 14430.

Baker, A. J., Hodges, K., Schiemann, R., and Vidale, P. L. [North Atlantic post-tropical cyclones in reanalysis datasets](#). European Geoscience Union 15th General Assembly, Vienna (2018). *Geophysical Research Abstracts* **20**, 14606.

Baker, A. J., Schiemann, R., Hodges, K., Roberts, M.L., and Vidale, P. L. Extratropical cyclones and extreme precipitation in high-resolution global climate models. National Centre for Atmospheric Science Staff Conference, Manchester (2018).

2017

Baker, A. J., Schiemann, R., Demory, M.-E., Hodges, K., Roberts, M., Shaffrey, L. C., and Vidale, P. L. Resolution sensitivity of the European winter rainfall response to RCP8.5 in HadGEM3. WGNE Workshop on Systematic Errors in Weather and Climate Models, Montréal (2017).

2014–2010

Baker, A. J., Dütsch, M., Läderach, A., Sodemann, H., Johnson, K.R., Baldini, J. U. L., Zhang, P. Modelling precipitation $\delta^{18}\text{O}$ at the northerly limit of the East Asian Summer Monsoon region. 7th International Conference Climate Change: The Karst Record, University of Melbourne (2014).

Baker, A. J., Sodemann, H., Breitenbach, S. F. M., Johnson, K. R., Baldini, J. U. L., van Hunen, J., and Zhang, P. Asian Monsoon moisture transport 1999-2005 and its implications for palaeomonsoon reconstructions. 23rd Goldschmidt Meeting, Florence (2013). *Mineralogical Magazine* **77**, 644.

Baker, A. J., Sodemann, H., Breitenbach, S. F. M., Johnson, K. R., Baldini, J. U. L., van Hunen, J., and Zhang, P. Asian Monsoon moisture transport 1999–2005 and its implications for palaeomonsoon reconstructions. American Geophysical Union Fall Meeting, San Francisco (2013).

Baker, A. J., Baldini, J. U. L., and Matthey, D. P. Modelling stalagmite growth rate and oxygen isotope composition. European Geoscience Union 8th General Assembly, Vienna (2011). *Geophysical Research Abstracts* **13**, 11750.

Baker, A. J., Baldini, J. U. L., Whitaker, T., and Jones, D. Modelling the growth rate and oxygen isotope composition of stalagmites. British Cave Research Association 22nd Cave Science Symposium, Cardiff University (2011). *Cave and Karst Science* **38**, 96.

Baker, A. J. and Baldini, J. U. L. Spatial and temporal variability in cave atmosphere $p\text{CO}_2$ and modelled stalagmite growth rates at Scoska Cave (North Yorkshire, UK): implications for calcite $\delta^{18}\text{O}$ records. British Cave Research Association 21st Cave Science Symposium, University of Bristol (2010). *Cave and Karst Science* **37**, 23.

Appendix 3 | Media engagement

Only engagements where I am the main contributor / interviewee are listed.

Related publication

California homeowners 'can no longer get insurance' with wildfires expected to get worse <i>The Mirror</i> , 1 st June 2023	Invited expert comment
Cyclone Freddy: The rare 'zombie storm' that is baffling meteorologists <i>ITV</i> , 9 th March 2023	Invited expert comment
Storms more likely to intensify rapidly due to climate change <i>NCAS News</i> , 21 st November 2022	Bhatia <i>et al.</i> , 2022
Hurricanes more likely to intensify within hours due to changing climate <i>Meteorological Technology International</i> , 21 st November 2022	Bhatia <i>et al.</i> , 2022
More intense hurricanes form rapidly due to climate change <i>University of Reading News</i> , 14 th November 2022	Bhatia <i>et al.</i> , 2022
Hurricane Ida was almost certainly made worse by climate change <i>New Scientist</i> , 31 st August 2021	Invited expert comment
Severe storms from tropics reach Europe once every five years on average <i>The Conversation</i> , 18 th May 2021	Baker <i>et al.</i> , 2021
Frozen lakes and underground waterfalls: Inside the Dark Star deep cave system <i>Science Focus</i> , 12 th May 2021	Invited expert comment
New analysis reveals a 'surprisingly high' number of landfalling tropical cyclones <i>Academic Times</i> , 2 nd May 2021	Baker <i>et al.</i> , 2021
Conquering the underground Everest <i>BBC Science Focus Magazine</i> , April 2021	Invited expert comment
Storms intensify in the Atlantic <i>Financial Times</i> , 31 st January 2021	Invited expert comment
Recent progress in simulating North Atlantic weather regimes <i>Weather and Climate @ Reading</i> , 5 th October 2020	Fabiano <i>et al.</i> , 2021
High-resolution insights into future European winters <i>Weather and Climate @ Reading</i> , 21 st October 2019	Baker <i>et al.</i> , 2019
Taking a closer look at Europe's future winters <i>NCAS News</i> , 1 st October 2019	Baker <i>et al.</i> , 2019
North Atlantic post-tropical cyclones <i>Weather and Climate @ Reading</i> , 7 th January 2019	Baker <i>et al.</i> , 2021