

Benjamin Harvey

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Present position

2014 – present NCAS-Weather Research Scientist in Dynamical Weather Processes
Department of Meteorology, University of Reading

Previous Employment

2011 – 2014 Post-doctoral Research Scientist (TEMPEST)
Department of Meteorology, University of Reading

Education

2007 – 2011 PhD in Atmosphere, Oceans and Climate, University of Reading
2006 – 2007 MMATH: Certificate of Advanced Study in Mathematics (Distinction),
Cambridge
2003 – 2006 MA in Mathematics (First Class Honours), Cambridge

RESEARCH

Research interests

Atmosphere dynamics; Rossby waves; extratropical storm tracks; climate variability and change.

Research highlights

I work as a Research Scientist for the Weather Directorate of the National Centre for Atmospheric Science (NCAS-Weather), with a focus on dynamical weather processes.

Previous to this I worked on the NERC-funded TEMPEST project (Testing and Evaluating Model Predictions of European Storms). There is a large spread in the responses of the extra-tropical storm tracks to climate change in different climate models. My role was to quantify the drivers of this spread: which factors influence the storm tracks, how are they projected to change in the future, and why do they vary between models? I answered these questions by (i) analysing data from the CMIP3 and CMIP5 multi-model ensembles, and (ii) designing and running a series of sensitivity experiments using the UK Met Office's Unified Model.

I obtained my PhD in 2011, entitled: Surface Effects in Quasi-Geostrophic Dynamics. The quasi-geostrophic equations have long been used as a simplified model of the atmosphere and oceans. In my thesis I analyse various wave and instability phenomena in this model, with a focus on the importance of boundary effects. One key result is the development of a new axis-symmetric model of baroclinic instability exhibiting key features of the real atmosphere, whilst simple enough to permit exact analytic solutions.

Academic publications

In preparation:

- **Harvey, B. J.**, Methven, J. and Ambaum, M. H. P.: Rossby wave propagation on finite-width potential vorticity fronts (to be submitted to J. Fluid Mech.)

Published:

- **Harvey, B. J.**, Shaffrey, L. C. and Woollings, T. J. (2015) *Clim. Dyn.*: Deconstructing the climate change response of the Northern Hemisphere storm tracks
- Vaughan, G., J. Methven J., et al (2014) *Bull. Am. Meteor. Soc.*: Cloud Banding and Winds in Intense European Cyclones: Results from the DIAMET Project
- Woollings, T. J., **Harvey, B. J.**, Masato, G. (2014) *Environ. Res. Lett.*: Arctic warming, atmospheric blocking and cold European winters in CMIP5 models
- **Harvey, B. J.**, Shaffrey, L. C. and Woollings, T. J. (2013) *Clim. Dyn.*: Large-scale temperature gradients and the extra-tropical storm tracks
- Woollings, T. J., **Harvey, B. J.**, Zahn, M. and Shaffrey, L. C. (2012) *Geophys. Res. Lett.* **39** L24802: On the role of the ocean in projected atmospheric stability changes in the Atlantic polar low region
- **Harvey, B. J.**, Shaffrey, L. C., Woollings, T. J., Hodges, K. I. and Zappa, G. (2012) *Geophys. Res. Lett.* **39** L18707: How large are projected 21st century storm track changes?
- **Harvey, B. J.** (2011) PhD Thesis, University of Reading: Surface Effects in Quasi-Geostrophic Dynamics
- **Harvey, B. J.**, Ambaum, M. H. P. and Carton, X. J. (2011) *J. Atmos. Sci.* **68** 964-971: Instability of surface quasi-geostrophic vortices
- **Harvey, B. J.** and Ambaum, M. H. P. (2010), *Geo. Astro. Fluid Dyn.* **105** 377-391: Perturbed Rankine vortices in surface quasi-geostrophic dynamics
- **Harvey, B. J.** and Ambaum, M. H. P. (2010) *Quart. J. Roy. Meteor. Soc.* **136** 1506-1513: Instability of surface temperature filaments in strain and shear

SCIENCE COMMUNITY AND COMMITTEE ACTIVITIES

Member of organising committee for the NCAS Early Career Forum, May 2015

Coordinator of the Departmental Seminar Series, 2012 - 2014

Member of the Royal Meteorological Society Meetings Committee, 2009-2011

Associate Fellow of the Royal Meteorological Society, 2008-present

Reviewer for: Climate Dynamics, Journal of Geophysical Research, Atmospheric Science Letters, Geophysical and Astrophysical Fluid Dynamics.

Teaching activities

Co-supervisor for a MOAP Undergraduate Research Experience Placement project at the University of Oxford (Summer 2015).

Developed and delivered a 10-week course of Atmospheric Physics tutorials to complement the MSc level Atmospheric Physics lectures at the University of Reading (Autumn 2014).

Supervised numerous MSc (2013,2014,2015) and BSc (2013,2015) dissertation projects.

Teaching assistant for BSc and MSc modules: "Fluid Dynamics of the Atmosphere and Oceans", "Atmosphere and Ocean Dynamics", "Engineering Mathematics" (2008-2011).