Natalie Harvey

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Present position

2013 – present	Research associate in statistics for volcanic ash hazards Department of Meteorology, University of Reading

Education

2009 – 2013	PhD in Atmosphere, Oceans and Climate, University of Reading
2006 – 2007	PGCE Secondary Science, University of Nottingham
2003 – 2006	BSc in Physics (First Class Honours), University of Nottingham

RESEARCH

Research interests

Atmospheric dispersion; boundary layer processes; forecast verification; quantification of uncertainty in dispersion models

Research highlights

I am currently working as a postdoctoral researcher on the volcanic ash strand of the Robust Assessment and Communication of Environmental Risk (RACER) project. This project aims to produce probabilistic forecasts of the dispersion of volcanic ash following an eruption. This is being achieved by develop a methodology to assess uncertainty in dispersion models and quantify their relative importance using emulation.

I obtained my PhD in 2013, entitled: Boundary-layer type classification and pollutant mixing. In the atmospheric boundary layer the vertical distribution of heat, momentum, water and pollutants is controlled by mixing that is turbulent. This complex mixing is parameterized in weather forecast and climate models. My thesis aims to address whether the parameterizations implemented in these models representative of the real world by firstly objectively classifying the observed boundary layer into nine different types based on the Met Office boundary layer scheme using long-term Doppler lidar and sonic anemometer data. This classification was used to create an observational climatology to evaluate the boundary layer type diagnosed by the 4km and 12km resolution of the Met Office Unified Model. This analysis revealed that the skill of predicting the correct boundary-layer cloud type was much lower than the skill of predicting the presence of cloud. The final part of my thesis involved conducting idealised single column modelling experiments to investigate the impact of boundary-layer type diagnosis on the vertical distribution of pollutants with in the boundary layer.

Academic publications

In preparation:

Dacre, H. F., **N. J. Harvey**, P. Webley and D. Morton, How accurate are volcanic ash forecasts?, *(submitted to Journal of Geophysical Research - Atmospheres.)*

Harvey, N. J., Huntley, N. et al. Emulation of a volcanic ash transport and dispersion model to quantify sensitivity to uncertain parameters *(to be submitted to Natural Hazards and Earth System Sciences)*

Published:

Harvey, N. J. and H. F. Dacre (2015), Spatial evaluation of volcanic ash forecasts using satellite observations, Atmos. Chem. Phys. Discuss., 15, 24727-24749,

Dacre, H. F., A. L. M. Grant, **N. J. Harvey**, D. J. Thomson, H. N. Webster, and F. Marenco (2015), Volcanic ash layer depth: Processes and mechanisms, Geophys. Res. Lett., 42, 637–645

Harvey, N.J., Hogan, R.J. and Dacre, H.F. (2014) Evaluation of boundary-layer type in a weather forecast model utilising long-term Doppler lidar observations. *Q J Roy. Meteor. Soc.*

Harvey, N. J., Hogan, R. J. and Dacre, H. F. (2013) A method to diagnose boundary-layer type using Doppler lidar. *Q J Roy. Meteor. Soc.* , 139 (676), 1681-1693

SCIENCE COMMUNITY AND COMMITTEE ACTIVITIES

Member of the organising committee for the University of Reading Environmental Risks to the Aviation Industry Event at the Science Museum (2013)

Member of the Royal Meteorological Society Meetings Committee (2012-present)

Coordinator of the Departmental PhD seminar series (2010-2012)

Associate Fellow of the Royal Meteorological Society (2009-present)

Teaching experience

Co-supervisor for an EPSRC Undergraduate Research Bursary: “Testing the structural uncertainties in volcanic ash cloud predictions and their impact on aviation” (Summer 2015).

Co-supervisor for a NERC Research Experience Placement project: “Modelling the vertical structure of volcanic ash clouds” (Summer 2013).

Teaching assistant for BSc and MSc modules: “Introduction to Weather Systems”, “Atmospheric Physics”, “Surface Energy Exchange”, “Boundary Layer Meteorology and Micrometeorology” and “Engineering Mathematics” (2009-2015).