Dr. Thomas Kent

Curriculum Vitae

Personal Details

Date of Birth:	17 July 1989
Nationality:	British
Phone:	+44 7821 413186
Website:	tkent198.github.io/
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Research Expertise

Mathematical and statistical modelling of atmospheric and environmental phenomena: geophysical fluid dynamics, hydraulic and shallow water-type modelling, numerical methods for hyperbolic problems, data assimilation (Kalman filtering), numerical weather prediction, flood modelling and mitigation, climate downscaling and bias correction, science outreach and communication.

Academic Employment

Aug. 2018 - Dec. 2020	Research fellow (0.5FTE) **School of Mathematics, University of Leeds, UK**
Jan. 2018 - Aug. 2020	Teaching Assistant (0.5FTE) **School of Mathematics, University of Leeds, UK**
Jan. - May 2017	Postdoctoral Research Associate **School of Mathematics, University of Leeds, UK**
Sept. 2016 - May 2017	Maths Support Tutor **Leeds University Library, UK**
May 2013- Dec. 2016	Postgraduate Research & Teaching Assistant **School of Mathematics, University of Leeds, and the Met Office, UK**
Sept. - Dec. 2012	Visiting Research Scientist **GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany**

Education

May 2013 - Dec. 2016	PhD Applied Mathematics **University of Leeds, UK**
Sept. 2011 - Sept. 2012	MSc Meteorology and Climatology (Distinction) **University of Birmingham, UK**
Aug. 2009 - Aug. 2010	Exchange Year (Erasmus Program) **Technical University of Dresden, Germany**
Sept. 2007 - July 2011	BSc Mathematics (First Class (Hons)) **University of Bristol, UK**
2000 - 2007	Dover Grammar School for Boys (state selective): 4 A levels, 11 GCSEs

Publications

Journals: in prep./submitted/arxived

2 **Kent, T.**, Cantarello, L., Inverarity, G., Tobias, S.M., Bokhove, O. (2020): Idealised forecast-assimilation experiments for convective-scale Numerical Weather Prediction. *Published at EarthArXiv.*

1 **Kent, T.**, Bokhove, O. (2020): Ensuring 'well-balanced' shallow water flows via a discontinuous Galerkin finite element method: issues at lowest order. *Published at arXiv:2006.03370 [physics.comp-ph].*

Journals: published

5 Bokhove, O., Hicks, T., Zweers, W. and **Kent, T.** (2020): Wetropolis extreme rainfall and flood demonstrator: from mathematical design to outreach. *Hydrol. Earth Syst. Sci.*, **24**, 2483–2503. **[Selected as a journal highlight - May 2020.]**

4 Bokhove, O., Kelmanson, M.A., **Kent. T.**, Piton, G. and Tacnet, J.-M. (2020): A cost-effectiveness protocol for flood-mitigation plans based on Leeds' Boxing Day 2015 floods. *Water*, **12**, 652.

3 Bokhove, O., Kelmanson, M.A., **Kent, T.**, Piton, G. and Tacnet, J.-M. (2019): Communicating (nature-based) flood-mitigation schemes using flood-excess volume. *River Res. Applic.* **35** 1402-1414.

2 **Kent, T.**, Bokhove, O., Tobias, S.M. (2017): Dynamics of an idealized fluid model for investigating convective-scale data assimilation. *Tellus A: Dynamic Meteorology and Oceanography*, **69(1)**, 1369332.

1 Wong, G., Maraun, D., Vrac, M., Widmann, M., Eden, J.M, and **Kent, T.** (2014): Stochastic model output statistics for bias correcting and downscaling precipitation including extremes. *J. Climate.* **27**, 6940–6959.

Theses

2 **Kent, T.** (2017): An idealised fluid model of convective-scale NWP: dynamics and data assimilation. *PhD Thesis, University of Leeds.*

1 **Kent, T.** (2012): Stochastic correction and downscaling of daily precipitation via a probability mixture model. *MSc Thesis, University of Birmingham.*

Teaching Experience

› Teaching assistant, School of Mathematics, Leeds (2013-20)

Overview: running tutorials/workshops for undergraduate mathematics courses at level 1 (class size: 10-15) & 2 (class size: 30-40), providing support for the lectures and weekly assignments including assessment. Where noted below, also delivering lectures* and module manager** (class size ca. 200).

List of courses: Mathematics 1 & 2 (comprising calculus, linear algebra, and mechanics), Calculus and Mathematical Analysis*, Modelling with Differential Equations**, Vector Calculus, Nonlinear Differential Equations, Introduction to Optimisation, Financial Mathematics, Bachelor's projects (student supervision).

› Maths support tutor, Leeds University Library (2016/17)

Overview: Providing one-to-one and small-group assistance at the Skills@Library drop-in service (3hrs/week), primarily for level 0 and 1 undergraduates from mathematics, engineering, and business/finance, but open to all students from disciplines with a numerate aspect.

Talks

5 invited seminars (Reading, Met Office, FU Berlin, Potsdam, LIFD); 8 (+ 2 upcoming) conference talks (in the UK, Europe, and USA); 3 internal seminars (Schools of Mathematics & Earth and Environment). An overview (excluding internal talks) follows below:

March 2021	Using idealised models in data assimilation research: from flooding to weather prediction, **Invited***: GAMM Young researchers' Minisymposium, Aachen (subject to award)*.
Oct 2020	Mathematical and numerical modelling of the Wetropolis flood and rainfall demonstrator, **Invited***: Leeds Institute for Fluid Dynamics ECR forum webinar.*
June 2020	Flood demonstrator 'Wetropolis': from design to research in flood mitigation and control, **Invited***: Flood modelling and forecasting challenges in industry workshop, University of Sheffield. [Cancelled due to Covid-19 pandemic.]*
May 2019	The modRSW model – physical basis, numerics, and dynamics, *DA workshop, University of Leeds.*
April 2019	Idealised forecast-assimilation experiments and their relevance for convective-scale Numerical Weather Prediction, *EGU General Assembly, Vienna.*
Sept. 2018	Using flood-excess volume to assess and communicate flood-mitigation schemes, *Leeds-Kyoto International Symposium: Advanced Engineering for Natural Disaster Identification, Mitigation, Prevention, and Response. Leeds.*
Mar. 2017	An idealised fluid model of convective-scale NWP: dynamics and data assimilation. **Invited***: Universität Potsdam and Freie Universität Berlin.*
Jan. 2017	Dynamics of an idealised fluid model of convective-scale NWP. *Dynamics of Rotating Fluids meeting, UCL.*
Nov. 2016	An idealised fluid model of convective-scale NWP: dynamics and data assimilation. **Invited***: Weather Science seminar, Met Office, Exeter.*
Nov. 2016	An idealised fluid model of convective-scale NWP: dynamics and data assimilation. **Invited***: DARC seminar, University of Reading.*
June 2015	An idealised fluid model for inexpensive DA and its relevance for NWP. *Workshop on Sensitivity Analysis and Data Assimilation in Meteorology, WV, USA.*
April 2015	A modified shallow water model for investigating convective-scale data assimilation. *EGU General Assembly, Vienna.*
July 2014	A modified shallow water model of convective-scale NWP. *CliMathNet conference 2014, University of Leeds.*
May 2014	A modified shallow water model for investigating convective-scale data assimilation. *Reading-Warwick Data Assimilation Meeting, University of Warwick.*

Awards and Funding

2020	EPSRC's Data Assimilation for the Resilient City (DARE) Pilot Project award (£24,216.50), August - December 2020.
2019	Research workshop grant: London Mathematical Society (£2500) and Leeds' School of Maths (£2500) for hosting DA workshop, 16-17 May 2019, Leeds.
2017	EPSRC Impact Accelerator Award (Business Engagement), University of Leeds
2014	Young Scientist travel award (€500), Int'l Symposium on Data Assimilation, Munich
2013	EPSRC CASE award (Univ. of Leeds and the Met Office; 3.5 years)
2012	EU COST Action VALUE Short Term Scientific Mission grant (€2500) for research visit to GEOMAR, Kiel, Germany.

Public Engagement and Outreach

2018-20	Contributor to the Data Assimilation for the Resilient City blog.
2018	Yorkshire iCASP confluence 2018, Brewery Wharf, Leeds, 15 June 2018: showcasing flood demonstrator Wetropolis to stakeholders.
2017	'Armley Mills Science Fair' at Leeds Industrial Museum, 26 March 2017. 'Be Curious', the research open day of the University of Leeds, showcasing our research with free, interactive and fun activities. 25 March 2017. 'Flood recovery and resilience' conference, Bilsborrow (near Preston; organised by the public Churchtown Flood Action Group), 29 Jan. 2017.
2016	'The Science of Floods', Hebden Bridge. Public event organised by Pennine Prospects and contribution from *Maths Foresees*, 8 May 2016.
2015-17	Wave tank demonstration at numerous undergraduate open days in the School of Mathematics, showcasing the maths of waves and fluid dynamics.

Computing and Programming proficiency

High:	Python, Matlab, LaTeX, Linux, GitHub, Microsoft Office
Intermediate:	R, html
Basic:	Fortran

Languages

English:	Native speaker
German:	Highly proficient (CEFR: C1, A Level: A)
French:	Intermediate (GCSE: A*)
Spanish:	Intermediate
Danish:	Beginner

Referees

1. Prof. Onno Bokhove – Chair in Geophysical Fluid Dynamics
   School of Mathematics, University of Leeds
   Email: o.bokhove@leeds.ac.uk
2. Prof. Steven Tobias – Director of Leeds Institute for Fluid Dynamics
   School of Mathematics, University of Leeds
   Email: s.m.tobias@leeds.ac.uk