

## Curriculum Vitae

### Dr. Nataliya Le Vine (née Bulygina)

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#### APPOINTMENTS

- 2013- 2015 Lecturer (Assistant Professor) in Hydrology, Dept of Civil and Environmental Engineering, Imperial College London, UK
- 2008 -2013 Research Associate, Dept of Civil and Environmental Engineering, Imperial College London, UK
- 2003 – 2007 Research Assistant, University of Arizona, USA

#### EDUCATION

- 2007 *PhD in Hydrology*, Department of Hydrology and Water Resources, University of Arizona, USA.  
Dissertation: Model structure identification and correction through data assimilation (supervised by Prof. Hoshin Gupta)
- 2003 *MS (Hons) in Applied Mathematics*, Department of Mechanics and Mathematics, Kharkov National University, Ukraine
- 2002 *BS (Hons) in Applied Mathematics*, Department of Mechanics and Mathematics, Kharkov National University, Ukraine

#### RESEARCH FUNDING

- 2014 – 2015 Elsie Widdowson Fellowship, Imperial College London, UK (£50K)
- 2012-2016 Probability, Uncertainty and Risk in Natural Environment, NERC, UK (Co-I, £208K)
- 2009 PhD fellowship from Fundação para a Ciência e Tecnologia, Portugal (to fund Susana Almeida, €120K)
- 2007 Salt River Project Doctoral fellowship, USA (\$10K)

#### PUBLISHED JOURNAL PAPERS

- 1) **Le Vine, N.**, A. Butler, N. McIntyre, and C. Jackson, 2015. Diagnosing hydrological limitations of a Land Surface Model: Application of JULES to a deep-groundwater chalk basin, HESSD, doi:10.5194/hessd-12-7541-2015.
- 2) Almeida S., **N. Le Vine**, N. McIntyre, T. Wagener, and W. Buytaert, 2015. Accounting for dependencies in regionalized signatures for predictions in ungauged catchments, HESSD, 12, 5389-5426, doi:10.5194/hessd-12-5389-2015.
- 3) Almeida S., **N. Bulygina**, N. McIntyre, T. Wagener, and W. Buytaert, 2013. Improving parameter priors for data-scarce estimation problems, Water Resour. Res., 49(9), 6090-6095, DOI: 10.1002/wrcr.20437.
- 4) McIntyre N., C. Ballard, M. Bruen, **N. Bulygina**, W. Buytaert, I. Cluckie, S. Dunn, U. Ehret, J. Ewen, A. Gelfan, T. Hess, D. Hughes, B. Jackson, T. Kjeldsen, R. Merz, J.-S. Park, E. O'Connell, G. O'Donnell, L. Oudin, E. Todini, T. Wagener, and H. Wheeler, 2013. Modelling the hydrological impacts of rural land use change: current state of the science and future challenges, Hydrology Research, Special Issue (*invited*), doi:10.2166/nh.2013.145.
- 5) Ewen, J., G. O'Donnell, E. O'Connell, **N. Bulygina**, C. Ballard, 2013. Towards understanding impact of changes in rural land management on flooding downstream, Q J Roy Meteor Soc, 139: 350-357(*invited*).
- 6) **Bulygina, N.**, N. McIntyre, H. Wheeler, 2012. A comparison of rainfall-runoff modelling approaches for estimating impacts of rural land management on flood flows, Hydrology Research, Special Issue: 'Top-down modelling for ungauged basins' (*invited*), doi:10.2166/nh.2013.034.
- 7) **Bulygina, N.**, C. Ballard, N. McIntyre, G. O'Donnell, and H. Wheeler, 2012. Integrating different types of information into hydrological model parameter estimation: Application to ungauged

- catchments and land use scenario analysis, *Water Resour. Res.*, 48, W06519, doi:10.1029/2011WR011207.
- 8) **Bulygina, N.** and H. Gupta, 2011. Correcting the mathematical structure of a hydrological model via Bayesian data assimilation, *Water Resour. Res.*, 47, W05514, doi:10.1029/2010WR009614.
  - 9) **Bulygina, N.**, N. McIntyre, and H. Wheeler, 2011. Bayesian conditioning of a rainfall-runoff model for predicting flows in ungauged catchments and under land use changes, *Water Resour. Res.*, 47, W02503, doi:10.1029/2010WR009240.
  - 10) **Bulygina, N.**, and H. Gupta, 2010. How Bayesian Data Assimilation can be used to Estimate the Mathematical Structure of a Model, *Stochastic Environmental Research and Risk Assessment*, V. 24 (6), 925-937 (*invited*).
  - 11) **Bulygina N.**, McIntyre N., Wheeler H., 2009. Conditioning rainfall-runoff model parameters for ungauged catchments and land management impacts analysis, *Hydrology and Earth System Sciences*, 13(6), 893-904.
  - 12) **Bulygina, N.** and H. Gupta, 2009. Estimating the uncertain mathematical structure of a water balance model via Bayesian data assimilation, *Water Resour. Res.*, 45, special issue on 'Uncertainty Assessment in Surface and Subsurface Hydrology' (*invited*), W00B13, doi:10.1029/2007WR006749.
  - 13) **Bulygina, N.S.**, M. A. Nearing, J. J. Stone, and M. H. Nichols, 2006. DWEPP: A dynamic soil erosion model based on WEPP source terms, *Earth Surface processes and Landform*, V.32(7), 998-1012.

#### JOURNAL PAPERS IN REVIEW

- 1) **Le Vine, N.** Combining information from multiple flood projections in a hierarchical Bayesian framework.

#### PAPERS IN PREPARATION

- 1) Prieto, C., **N. Le Vine**, E. García, and R. Medina, Assessing relative impacts of regionalization quality and model adequacy on flow predictions: Bayesian approach.
- 2) Orellana-Bobadilla, B., **N. Le Vine**, and A. Butler, Probabilistic drought prediction using the Land Surface JULES for South East England.
- 3) Bakopoulou, C., **N. Le Vine**, A. Butler, and N. McIntyre, Representing soil heterogeneity within the Land Surface Model JULES.

#### PEER-REVIEWED CONFERENCE PAPERS

- 1) Almeida, S., **N. Bulygina**, N. McIntyre, T. Wagener, W. Buytaert, 2012. Predicting flows in ungauged catchments using correlated information sources, in Proceedings of the BHS International Hydrology Symposium, Dundee, UK, 9-11 July, 2012.
- 2) Bakopoulou, C., **Bulygina N.**, Butler A., McIntyre N., 2012. Sensitivity Analysis and Parameter Identifiability of the Land Surface Model JULES at the point scale in permeable catchments, in Proceedings of the BHS International Hydrology Symposium, Dundee, UK, 9-11 July, 2012.
- 3) McIntyre, N., C. Ballard, **N. Bulygina**, Z. Carroll, I. Cluckie, S. Dangerfield, J. Ewen, J. Geris, A. Henshaw, B. Jackson, M. Marshall, T. Pagella, J.-S. Park, B. Reynolds, E. O'Connell, G. O'Donnell, F. Sinclair, I. Solloway, C. Thorne, H. Wheeler, 2012. The potential for reducing flood risk through changes to rural land management: outcomes from the Flood Risk Management Research Consortium, in Proceedings of the BHS International Hydrology Symposium, Dundee, UK, 9-11 July, 2012 (*keynote*).
- 4) **Bulygina, N.**, N. McIntyre, H. Wheeler, and C. Ballard, 2010. Bayesian conditioning of a rainfall-runoff model for predicting flows in ungauged catchments and under land use changes, in Proceedings of the BHS International Hydrology Symposium, Newcastle University, UK, 19-23 July, 2010.

#### BOOK CHAPTERS

- 1) Wheeler, H., N. McIntyre, **N. Bulygina**, C. Fraser, and B. Jackson, 2013. Prediction in Ungauged Basins – The Challenge of Catchment Non-Stationarity, in: Pomeroy, J., P. Whitfield, and C. Spence (eds), 'Putting Prediction in Ungauged Basins into Practice', Canadian Water Resources Association, pp. 117-140, ISBN 978-1-896513-38-6.

- 2) Wheeler, H., C. Ballard, **N. Bulygina**, N. McIntyre, and B. Jackson, 2012. Modelling Environmental Change: Quantification of Impacts of Land Use and Land Management Change on UK Flood Risk, in: 'System Identification, Environmental Modelling and Control', Springer, pp. 449-481, doi 10.1007/978-0-85729-974-1\_22.
- 3) Wheeler, H., McIntyre, N., Jackson, B., Marshall, M., Ballard, C., **Bulygina, N.**, Reynolds, B., Frogbrook, Z., 2010. Multi-scale impacts of land management on flooding, book chapter in: Flood Management Handbook.

#### OTHER

- 1) McIntyre, N., Ballard, C., J.-S. Park, A. Henshaw, T. Pagella, S. Dangerfield, J. Ewen, **N. Bulygina**, M. Marshall, B. Reynolds, H. Wheeler, G. O'Donnell, B. Jackson, E. O'Connell, C. Thorne, I. Cluckie, F. Sinclair, 2013. Land use management effects on flood flows – guidance on prediction, CIRIA (Construction Industry Research and Information Association), UK.
- 2) **Bulygina N. S.**, 2007. Model Structure Estimation and Correction through Data Assimilation, PhD Thesis, Department of Hydrology and Water Resources, The University of Arizona, Tucson, USA.
- 3) **Bulygina, N. S.**, 2003. Eigen vectors and vectors for electro-magnetic field in a resonator. MSc thesis, Department of Mechanics and Mathematics, Kharkov National University, Kharkov, Ukraine.

#### PRESENTATIONS (SELECTED)

- 1) **Le Vine, N.**, Combining information from multiple flood projections in a hierarchical Bayesian framework, Royal Statistical Society annual conference, Exeter, UK, Sep 2015.
- 2) **Le Vine, N.**, A. Butler, N. McIntyre, and C. Jackson, Revising Hydrology of a Land Surface Model, EGU conference, Vienna, Austria, Apr 2015.
- 3) Prieto, C., **N. Le Vine**, E. García, and R. Medina, Improving standard practices for prediction in ungauged basins, EGU conference, Vienna, Austria, Apr 2015.
- 4) Orellana-Bobadilla, B., **N. Le Vine**, A. Butler, N. McIntyre, and C. Jackson, Integrated modelling approach for water resources assessment, BHS conference: Groundwater Extremes and Surface Water Impacts, London, ICE, Dec 2014.
- 5) Butler, A., A. Hughes, D. Peach, C. Jackson, **N. Le Vine**, K. Upton, N. McIntyre, R. Chandler and A. Wade, Developments in understanding and modelling extreme events from the atmosphere to the catchment, BHS conference: Groundwater Extremes and Surface Water Impacts, London, ICE, Dec 2014.
- 6) Orellana-Bobadilla, B., **N. Le Vine**, A. Butler, N. McIntyre, and C. Jackson, A new hydrology for JULES to model chalk catchments, Workshop on JULES hydrology, June 2014, CEH Wallingford, UK.
- 7) Almeida, S., **N. Bulygina**, N. McIntyre, T. Wagener, and W. Buytaert, The value of regionalized information for hydrological modeling, Dec 2013, AGU, San Francisco, USA.
- 8) **Bulygina N.**, N. McIntyre, and A. Butler, Adapting JULES for groundwater dominated catchments, Annual JULES meeting, Dec 2012, Exeter, UK (*invited*).
- 9) **Bulygina N.**, S. Almeida, W. Buytaert, N. McIntyre, T. Wagener, Trading Space for Time in Bayesian Framework, AGU conference, Dec 2012, San Francisco, USA.
- 10) Wheeler H., **N. Bulygina**, C.E. Ballard, N. McIntyre, B.M. Jackson, Modelling catchment non-stationarity – multi-scale modelling and data assimilation, AGU conference, Dec 2012, San Francisco, USA (*invited*).
- 11) McIntyre N., **N. Bulygina**, and A. Butler, Improved coupling of surface and groundwater for high resolution water cycle models, AGU conference, Dec 2012, San Francisco, USA.
- 12) Almeida S., **N. Bulygina**, N. McIntyre, T. Wagener, W. Buytaert, Importance of the prior distribution for regionalization, IAHS symposium on PUB, Oct 2012, Delft, Netherlands.
- 13) McIntyre N., **N. Bulygina**, Aligning hydrological response spaces for prediction in ungauged catchments, IAHS symposium on PUB, Oct 2012, Delft, Netherlands (*invited*).
- 14) McIntyre N., S. Almeida, **N. Bulygina**, T. Wagener, and W. Buytaert, Exploring Uncertainty and Information Content of Regionalised Hydrological Indices, MODSIM Conference, Dec 12-16, 2011, Perth, Australia.
- 15) **Bulygina N.**, C. Ballard, N. McIntyre, M. Marshall, C. Thorn, and H. Wheeler, Modelling strategies to predict the multi-scale effects of rural land management change, AGU

- conference, Dec 2011, San Francisco, USA.
- 16) Wheeler H., **N. Bulygina**, N. McIntyre, How to reduce uncertainty when land use change is creating non-stationarity, Putting PUB into Practice, May 10-14, 2011, Canmore, Canada.
  - 17) Almeida S., **N. Bulygina**, K. Sawicz, N. McIntyre, T. Wagener, and W. Buytaert, A Bayesian Framework for Prediction for Ungauged Basins (poster), EGU, Apr 4-8, 2011, Vienna, Austria.
  - 18) Gupta H., M. Clark, J. Vrugt, **N. Bulygina**, H. Kling and G. Martinez, Using Data to Detect and Resolve Model Structural Errors, Presentation (*invited*) at Session on Advances in Development of Land Data Assimilation Methods, 91st AMS Annual Meeting, Seattle, Washington, Jan 23-27, 2011.
  - 19) C. E. Ballard, **N. Bulygina**, N. McIntyre, and H. S. Wheeler, Upscaling Physics-based Models to Estimate Catchment Scale Effects of Localised Tree Planting, Fall AGU Meeting, San Francisco, CA, Dec, 2010 (oral).
  - 20) Gupta H., and **N. Bulygina**, Correcting the Mathematical Structure of a Hydrological Model Via Bayesian Data Assimilation, Presentation (*invited*) at Session H18 on Advances in Hydrologic Data Assimilation and Uncertainty Analysis, Fall AGU Meeting, San Francisco, CA, Dec 23-27, 2010.
  - 21) **Bulygina N.**, and H. Gupta, Correcting the Mathematical Structure of a Hydrological Model via Bayesian Data Assimilation, EGU, 3-7, May, 2010, Vienna, Austria (oral).
  - 22) **Bulygina N.**, McIntyre N., and Wheeler H., Bayesian conditioning of a rainfall-runoff model for predicting flows in ungauged catchments and under land use changes, , EGU, 3-7, May, 2010, Vienna, Austria (poster).
  - 23) **Bulygina N.**, McIntyre N., and Wheeler H., Bayesian conditioning of hydrological models using regionalized indices, AGU, 14-18, December, 2009, San Francisco, CA, USA (oral)
  - 24) Gupta H., and **N. Bulygina**, Identification and Correction of Environmental Model Structures Via Bayesian Data Assimilation, Presentation (*invited*) in Session HW7: New Statistics in Hydrology, IAHS 2009 Symposium in Hyderabad, India, 6-12 September 2009.
  - 25) Gupta H., and **N. Bulygina**, Identification and Correction of Environmental Model Structures Via Bayesian Data Assimilation (oral), 18th IMACS World Congress MODSIM 09, Cairns, Australia, 13-17 July 2009
  - 26) **Bulygina N.**, and H. Gupta, Estimating the uncertain mathematical structure of a hydrological model via Bayesian data assimilation (poster), Fall 2008 AGU Meeting, San Francisco, California, USA
  - 27) **Bulygina N.**, and H. Gupta, Model structure identification and correction through data assimilation, January, 2008, CAHMDA-III Catchment-scale Hydrological Modelling & Data Assimilation International Workshop, University of Melbourne, Melbourne, Australia
  - 28) **Bulygina N.**, and H. Gupta, Model structure identification and correction through data assimilation (oral), Fall 2007 AGU Meeting, San Francisco, California, USA
  - 29) **Bulygina N.**, and H. Gupta, Model structure identification and correction through data assimilation, 2007, Recent Advances in Water Resources, 40th Colloquium (*invited*), TU Delft, Netherlands.
  - 30) **Bulygina N.**, and H. Gupta, Model structure identification and correction through data assimilation (oral), IUGG, July, 2007, Perugia, Italy.
  - 31) **Bulygina N.**, and H. Gupta, Model structure identification and correction through data assimilation (poster), Fall 2006 AGU Meeting, San Francisco, California, USA.

#### TEACHING

2009-present	Rainfall – Runoff Modelling (MSc), Imperial College London
2009-present	Stochastic Hydrology (MSc), Imperial College London
2013-present	Fluid Mechanics (MSc), Imperial College London
2013-present	Water Resources Engineering (BSc), Imperial College London
2015-present	Statistical Analysis (PhD), Imperial College London

**PHD STUDENTS**

- 2010-2014 Susana Almeida, thesis: The value of regionalized information for hydrological modeling, Imperial College London
- 2011 -2015 Christina Bakopoulou, thesis: Critical assessment of structure and parameterisation of JULES Land Surface Model at different spatial scales in a UK Chalk catchment, Imperial College London.
- 2011 -2015 Claudia Vitolo, thesis: Exploring Web Technologies and Big Data for Hydrological Modelling, Imperial College London
- 2013 -2016 (exp) Cristina Prieto, topic: Improving standard practices for prediction in ungauged basins, IH Cantabria, Spain.

**PRIZES OBTAINED BY SUPERVISED STUDENTS**

- 2015 Susana Almeida, Best PhD thesis of the year (Unwin prize), Civil and Environmental Department, Imperial College London
- 2015 Beth Waring, Best hydrology MSc thesis of the year (Appleby prize), Civil and Environmental Department, Imperial College London

**Workshops Organized & Conference Sessions Chaired**

- 2011 International workshop: 'Modelling land use change impacts on flood responses', Imperial College London, UK, 13-14 June.
- 2011 & 2012 AGU, San Francisco, USA: 'A Grand Challenge: Developing the Science for High Resolution Global Water-Energy-Biogeochemical Cycle Modeling'.
- 2009 AGU, San Francisco, USA: 'Reconciling models with data and complexity: Evaluation, Diagnosis and Correction of model structural errors'.

**PROFESSIONAL MEMBERSHIP**

- A member of American Geophysical Union  
A member of British Hydrological Society  
Founding member of Forecasting an Environmental Change Network, UK  
Fellow of a Royal Statistical Society