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Research Interests

My research interests primarily lie in nonstationary time series, change point detection and wavelet methods in statistics. My current research has a strong emphasis on the development of new statistical models and methodology for analysing time series that display time-varying statistical properties, with particular interest in applications to environmental science and finance.

Professional Experience

- **Research Associate** — Bristol, UK
  School of Mathematics, University of Bristol — *Aug. 2020 – present*
  Research areas: change point analysis, nonstationary time series

- **Research Intern** — Lancaster, UK
  STOR-i Centre for Doctoral Training, Lancaster University — *Jul. 2015 – Sep. 2015*
  Research topic: Used Bayesian change point analysis to model linguistic style of the author Fanny Burney.

Education

- **Lancaster University** — Lancaster, UK
  PhD in Statistics and Operational Research — *Oct. 2017 – Jul. 2020*
  Supervisors: Rebecca Killick and Matthew Nunes
  Thesis title: Wavelet Methods for Locally Stationary Time Series

- **Lancaster University** — Lancaster, UK
  MRes in Statistics and Operational Research; ***Distinction*** — *Oct. 2016 – Sep. 2017*
  Dissertation title: Novel Wavelet Models for Nonstationary Time Series

- **University of Glasgow** — Glasgow, UK
  Msci in Mathematics; ***First class honours*** — *Sep. 2011 – Jun. 2016*

Publications

- **Refereed Journal Articles**
  - McGonigle, E. T. and Cho, H. (2022+) Robust multiscale estimation of time-average variance for time series segmentation. *Computational Statistics and Data Analysis* (to appear). [Open Access link] [Link to code on Github].
  - McGonigle, E. T., Killick, R., and Nunes, M. A. (2022) Modelling time-varying first and second-order structure of time series via wavelets and differencing. *Electronic Journal of Statistics*, 16 (2):4398-4448. [Open Access link] [Link to code on Github].
  - McGonigle, E. T., Killick, R., and Nunes, M. A. (2022) Trend locally stationary wavelet processes. *Journal of Time Series Analysis*, 43(6):895?917. [Open Access link] [Link to code on Github].
  - McGonigle, E. T., Killick, R., and Nunes, M. A. (2021) Detecting change in mean in the presence of time-varying autocovariance. *Stat* 10 (1), e351. [Open Access link].

- **Preprints**
  - McGonigle, E. T. and Peng, H. (2021) Subspace Change-Point Detection via Low-Rank Matrix Factorisation. *ArXiv preprint arXiv:2110.04044*. [arXiv link].

Talks

- **Invited**
  - **Change point detection for complex time series data**
    EcoSta 2021 (virtual), HKUST, Hong Kong *Jun. 2021*
  - **Modelling nonstationary time series with wavelets and differencing**
    University of Bristol Statistics Seminar, UK *Nov. 2020*
  - **Modelling nonstationary time series with wavelets**
    Numerical Algorithms Group, Oxford, UK *Oct. 2019*
  - **Detecting changes in mean in the presence of autocovariance**
    2019 Joint Statistical Meetings, Denver, Colorado, USA *Jul. 2019*
- **Contributed**
  - **Nonparametric change point analysis of multivariate time series**
    Royal Statistical Society International Conference 2022, Aberdeen, UK *September 2022*
  - **Modelling time-varying first and second-order structure of time series via wavelets and differencing**
    Lancaster University Workshop on Time Series and Spatial Statistics, UK *May 2020*
  - **Detecting changes in mean in the presence of autocovariance**
    STOR-i PhD forum, Lancaster, UK *May 2019*
  - **Locally stationary wavelet processes with trend**
    STOR-i PhD forum, Lancaster, UK *Jun. 2018*

Teaching & Supervision

- **Teaching**
  - **Tutor**, University of Bristol, *Jan. 2021 – present*
    - Tutor for 1st year Probability
    - Ran online drop-in sessions for 3rd year Multivariate Analysis
  - **Lecturer**, Introduction to R Programming, Lancaster University, *Jul. 2018 – Jul. 2019*
    Prepared and delivered an R training course for the STOR-i research interns.
  - **Graduate Teaching Assistant**, Lancaster University, *2017 – 2020*
    Delivered workshops and tutorials in a range of modules:
    - MATH103 Probability I
    - MATH104 Statistics
    - MATH105 Linear Algebra I
    - MATH215 Complex Analysis
    - MATH225 Abstract Algebra
    - MATH230 Probability II
    - MATH235 Statistics II
    - MATH334 Time Series Analysis
    - STOR605 Inference and Modelling
  - **Undergraduate Teaching Assistant**, University of Glasgow, *Jan. – May 2016*
    Undergraduate teaching assistant for Mathematics 2D Topics in Linear Algebra and Calculus.
- **Supervision**
  - **STOR-i 2018 Summer Internship**, Supervisor, Lancaster University, *Jul. – Sep. 2018*
    My responsibility was to design a research project and supervise an undergraduate research intern.

Honours & Awards

- **Research Conference Travel Fund**, Lancaster University *Feb. 2020*
- **Dougall Prize for Distinction in Honours Mathematics**, University of Glasgow *Jun. 2016*

Other Professional Activities

- **Refereeing**: Journal of the American Statistical Association, Environmental and Ecological Statistics, Journal of the Korean Statistical Society, Journal of Multivariate Analysis, Journal of Statistical Software, Statistics and Computing.
- **Consultancy**: Have participated in the Statistics Clinic, a free statistical consulting service for researchers at University of Bristol since 2021.
- **Memberships:** Fellow of the Royal Statistical Society.

Service

- Student representative for Masters students, Lancaster University, 2016 – 2017.
- STOR-i Centre for Doctoral Training website organiser, 2017 – 2020.

Technical Skills

- **Programming Languages**: R (advanced), MATLAB (intermediate), C (intermediate).
- **Programming Skills**: R Package development, interfacing `R` with C.