Ewan Pinnington

email: ewan.pinnington@gmail.com

PhD project

Reading University (2013 - Present)

- **Title**: Understanding the information content in diverse observations of forest carbon stocks and fluxes for data assimilation and ecological monitoring.

- **Description**: Improvement of model predictions of forest carbon balance by the implementation and improvement of data assimilation techniques. Specifically I examined the carbon balance of my research site following disturbance after thinning from management practices. Data assimilation is a mathematical technique for combining observations with a mathematical model to improve model forecasts. I developed techniques to better understand and represent information from both models and observations in data assimilation schemes, for example the errors in eddy-covariance data. As part of the project I was based at a flux tower site in southern England, which has a 15 year record of flux data.

Skills

- **Programming**: Much of my experience of coding has been with Python but I also have some familiarity with Matlab and Fortran. In the time on my PhD project I have demonstrated on three Python software courses. I am confident both with functional and object oriented programming in Python. I also have experience working with large datasets in Python in many formats including NetCDF.

- **Version control**: During my PhD I have used Git version control software to track and commit all the changes I have made to code I have written and also host my code on GitHub including documentation.

- **Fieldwork**: I have conducted an extensive fieldwork campaign to measure leaf area index using a ceptometer, hemispherical photographs and regularly sampling litter traps at a forest research station in southern England. I have familiarity in measurements of soil, litter and stem respiration using a LI-COR infrared gas analyser. I also made measurements of diameter at breast height from which I derived biomass via an allometric equation and worked extensively with eddy covariance data from the flux tower at the site.

- **Modelling and data assimilation**: I have coded my own version of the ecosystem carbon balance model DALEC in Python, including tools to find the derivative of the model code via automatic differentiation. I have also implemented my own data assimilation routine with this ecosystem model, using the technique of Four-Dimensional Variational data assimilation (4D-Var). This involved processing a large amount of data, including field observations and meteorology to combine with and drive the DALEC ecosystem model.

- **Communication**: I have good communication skills having given a number of presentations. I gave an oral presentation at the 2016 EGU general assembly in Vienna for the "Developments in terrestrial biogeochemical models using model-data integration" working group. I have also given oral presentations to the Royal Meteorological Society and reached the finals of Reading University's three-minute presentation competition.

Qualifications

Reading University (2009 - 2013)

Mathematics BSc Hons, 1st

- **Average grades**: Year 1 - 75%, Year 2 - 80%, Year 3 - 82%.
- **Awards**: Received the award for excellent achievement in both year 2 and 3 of my degree.
- **Modules included**: Analysis, Algebra, Communicating Mathematics, Cryptography, Mathematics for the Digital Economy and Numerical Analysis.
- **Skills developed**: Analytic and lateral thinking, teamwork, mentoring, problem solving, programming, presenting, time and personal management.

Science Foundation Year

- (Mathematics, Physics, Chemistry) at A-level standard. 1st overall with a high 1st in Mathematics.

Sandy Upper School (2002 - 2007)

- A-levels: Mathematics (C), Drama (B), Communication studies (B)
- Awarded the Sherwood Cup for contribution to Drama.
- 10 GCSE's including Maths (A), English (B) and Double Science (AA)

Driving Licence

- Clean driving licence held since December 2006.

Work experience

Personal Tutor (2010 - 2011)

Gave personal tuition to a student studying A-level Mathematics. This helped me significantly improve my ability to communicate advanced mathematical ideas to someone without previous experience of them. I found this very rewarding, helping the student to pass their exams.

Global Talent Publishing (2007 - 2009)

As front man for a band, I signed a three year publishing deal with Global Talent (www.thisisglobal.com). The group were given advance payments for song writing and for performances in the UK and USA. I developed confidence and presentational skills performing on stage in front of many different audiences. I gained good life experience travelling America whilst performing there.

First Choice Recruitment (2008 - 2010)

Undertook a number of varied temporary assignments; Warehouse work, Catering and hospitality and Landscape gardening. I gained excellent communication skills whilst working with a large variety of people from different backgrounds, as I undertook different temporary assignments. I became able to adapt quickly to different environments and tasks set.

Publications

- Pinnington et al. (2016). Investigating the role of prior and observation error correlations in improving a model forecast of forest carbon balance using four-dimensional variational data assimilation. *Agricultural and Forest Meteorology.* doi: http://dx.doi.org/10.1016/j.agrformet.2016.07.006
- Pinnington et al. (2016). Using data assimilation to understand the effect of disturbance on a managed deciduous woodland. *Manuscript in preparation for submission to JGR: Biogeosciences.*