

Dr Declan Valters

Research Software Engineer

Global Change Research Institute – University of Edinburgh

GitHub: <https://github.com/dvalters>

Website: <http://dvalts.io>

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Employment

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| • Research Software Engineer
<i>School of Geosciences</i> | University of Edinburgh
11/2017 – present |
| • Scientific Software Engineer
<i>Modelling Infrastructure Support Systems</i> | Met Office
03/2017 – 11/2017 |
| • Software Developer (PhD work placement)
<i>Satellite Applications</i> | Met Office
06/2015 – 10/2015 |
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Education

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| • PhD in Earth, Atmospheric, and Environmental Science
<i>Thesis: Modelling catchment sensitivity to rainfall resolution and erosional parameterisation in simulations of flash floods in the UK</i> | University of Manchester
2013 – 2017 |
| • Master in Earth Science (Hons., 1st Class)
<i>Thesis: Extracting tectonic information using statistical methods of river profile analysis</i> | University of Edinburgh
2009 – 2013 |
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Software Projects

- **Global Change Ecology Lab Software** <https://github.com/GCEL>
Extended functionality of the LVT (Land Surface Verification Toolkit) to read JULES input data. (**Fortran**)
Development of a python interface to the SPECCHIO spectral information system. (**Python**)
Implementation of git version control and support of best practices in software engineering for scientists in the research group.
- **Cylc and Rose** <https://cylc.github.io/cylc>
Met Office applications for numerical modelling infrastructure support.
Development of the Cylc software package, a scientific workflow manager and scheduler (**Python**).
Development of the Rose software framework for configuration of meteorological applications (**Python**).
- **HAIL-CAESAR: A numerical landscape evolution model for HPC** <http://dvalts.io/HAIL-CAESAR>
Originally my PhD software project. A C++ cellular automaton model ported to HPC (High performance computing) facilities through a shared-memory parallelism model (**OpenMP**).
I translated and developed the CAESAR-Lisflood numerical model from a C#/.NET application into a platform-independent code suitable for high-performance computer use such as ensemble simulations and sensitivity analyses.
- **Land Surface Dynamics Topographic Toolbox** <http://lsdtopotools.github.io>
Object-oriented C++ topographic analysis and modelling package developed with the Land Surface Dynamics research group at Edinburgh. The continuing aim of the project is to implement state-of-the-art algorithms as they are published in academic literature. A key aim of LSDTopoTools is to facilitate reproducible scientific data analysis for large topographic datasets.
My contributions have been to improve parallelisation (**OpenMP**) within the code. develop the statistical analysis tools (C++), visualisation and automation scripts (**Python**) for task-farming sensitivity analyses.

- **Numerical Weather Prediction – Satellite Application Facility website**

<https://nwpsaf.eu>

Redevelopment of the Met Office/European Meteorological Satellite facility website. A public website used for the retrieval of post-processed satellite data and imagery.

Designed and implemented a **MySQL** database for satellite image metadata, integrated with a Javascript front-end for retrieval and rendering of data and imagery.

I wrote several tools for keeping the database maintained automatically (**Shell scripts/Python/PHP**) as new data were added.

Technical Skills

Programming Languages & Software

- My current working languages are **Python** (including NumPy, Matplotlib), **C++** and **Fortran**.
- Experience in HPC applications including implementing **OpenMP**-style parallelism, as well as **MPI** approaches to parallelisation.
- Experience in using **subversion** and **git** version control systems.
- Previously I've worked on projects using **Javascript** and **PHP** for web development.
- Basic knowledge of **Matlab** and **C**.
- Experience in using and modifying the **WRF** numerical weather prediction model and familiarity with the Met Office **Unified Model** (UM).

Professional Development

- **Programming/Technical courses** **2-3 day courses, provided by ARCHER/EPCC**
 - Fortran Modernisation *February 2017*
 - Writing scalable parallel applications with MPI *December 2016*
 - Advanced MPI *September 2016*
 - Advanced OpenMP *August 2016*
 - Message-passing programming with MPI *July 2016*
 - Single-node performance optimisation *December 2015*
 - Shared Memory programming with OpenMP *December 2015*
 - Extended introduction to CUDA *November 2015*
- **Numerical Weather Prediction Model training**
 - The Weather Research and Forecasting Model (WRF) *NCAS/NCAR – October 2013*
 - Met Office Unified Model (UM) *NCAS/University of Reading – December 2014*
- **Professional memberships**
 - Royal Meteorological Society
 - UK Research Software Engineers Network

Teaching roles and mentoring experience

- Conference workshops written and delivered
 - EuroScipy 2018 – Introduction to Parallelism in Python
 - Research Software Engineering 2018 Conference - Introduction to Parallelism in Python
- Workshops - University of Edinburgh *2018 – present*
 - Introduction to Fortran
 - Introduction to Python
 - Pandas for Data Analysis
- Teaching Assistant – University of Manchester *2013 – 2016*
 - Fortran and Matlab for engineers - MSc course

Grants and Awards

- ECMWF Summer of Weather Code ECMWF grant to develop Python software for enabling a NetCDF as filesystem in user space (FUSE)
 - ARCHER eCSE Co-Investigator (PI - Simon Mudd) Enabling multi-node MPI parallelisation of the LISFLOOD flood-inundation model within the LSDTopoTools modelling framework (3 months)
 - 5th Intel Xeon Phi Access Programme STFC, Hartree Centre – (Porting the LISFLOOD/HAIL-CAESAR model to the Xeon Phi architecture (4 months trial))
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Relevant community service and voluntary roles

- Journal of Open Source Software – Reviewer *2017 – present*
- EuroPython 2018 Session chair and Conference volunteer
- Conference volunterr – PyCon Ireland 2016
- Research Software Engineering conference volunteer – RSE16 2016
- British Society for Geomorphology – Web Officer *2015 – 2017*
- Founder of the Python users Group in the Centre for Atmospheric Science (University of Manchester)