Dr Declan Valters

Research Software Engineer

Global Change Research Institute – University of Edinburgh
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Employment

- **Research Software Engineer** — **University of Edinburgh**
  School of Geosciences — *11/2017 – present*
- **Scientific Software Engineer** — **Met Office**
  Modelling Infrastructure Support Systems — *03/2017 – 11/2017*
- **Software Developer (PhD work placement)** — **Met Office**
  Satellite Applications — *06/2015 – 10/2015*

Education

- **PhD in Earth, Atmospheric, and Environmental Science** — **University of Manchester**
  Thesis: Numerical modelling of catchment sensitivity to rainfall resolution and erosional parameterisation in simulations of flash floods in the UK — *2013 – 2017*
- **Master in Earth Science** (Hons., 1st Class) — **University of Edinburgh**
  Thesis: Extracting tectonic information using statistical methods of river profile analysis — *2009 – 2013*

Software Projects

- **FUSE-netcdf** — https://github.com/dvalters/fuse-netcdf

  Python: ECMWF small grant awarded from the *European Summer Of Weather Code* project to design and implement a FUSE-based filesystem for mounting, viewing, and editing NetCDF files as user-space file system on Linux operating systems.

- **Global Change Ecology Lab Software** — https://github.com/GCEL

  Python: Further development of the International Land Model Benchmarking system (ILAMB).
  Fortran: Extended functionality of the Land Surface Verification Toolkit (LVT).
  Python, MySQL, PostGreSQL, PostGIS: Development of a Python interface to the SPECCHIO spectral information system.
  Git: 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.
  Python: Development of the Cylc software package, a scientific workflow manager and scheduler.
  Python: Development of the Rose software framework for configuration of meteorological applications.

- **HAIL-CAESAR: A numerical landscape evolution model for HPC** — http://dvalts.io/HAIL-CAESAR

  C++, OpenMP: cellular automaton model ported to HPC (High performance computing) facilities through a shared-memory parallelism model.
  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

  C++, Python: Object-oriented 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

  Python, PHP, Javascript: 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 as new data were added.

Grants and Awards

- ARCHER eCSE13-21 Co-Investigator and funded Technical Staff Member (PI - Simon Mudd) Implementing parallel I/O within LISFLOOD to enable high-resolution massively parallel hydrogeomorphic simulations (6 months)
- ECMWF Summer of Weather Code ECMWF grant to develop Python software for enabling a NetCDF as filesystem in user space (FUSE)
- ARCHER eCSE12-17 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)

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

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**

C++17 new features workshop	*December 2018*
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

Relevant community service and voluntary roles

- Journal of Open Source Software – Reviewer *2017 – present*
- EuroPython 2018 Session chair and Conference volunteer
- Conference volunteer – 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)