

# Dr Declan Valters

## Research Software Engineer

School of GeoSciences – University of Edinburgh

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

Website: <http://dvalts.io>

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## Employment

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

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

- **LISFLOOD model HPC parallelisation project** <https://github.com/dvalters/hail-caesar>  
**C++, OpenMP, MPI:** Co-Investigator on going project funded from two grants from UK National Super-computer (ARCHER) budget to port and parallelise a coupled flood-inundation and sedimentation model to massively parallel systems. Extends model parallel capability to multi-node compute architecture using the LibGeoDecomp library.
- **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 written and delivered - 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

## Relevant community service and voluntary roles

- Software Carpentry Institute Certified Instructor 2018 – present
- 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)

- **Professional memberships**

British Society for Geomorphology  
Association of Research Software Engineers  
British Cartographic Society