

# Dr Declan Valters

## Geoscience Software Developer

British Geological Survey, Research Avenue South, Edinburgh, EH14 4AP

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

EMail: decval@bgs.ac.uk

---

## Employment

- |  |  |
|--|--|
| • <b>Geoscience Software Developer</b><br><i>BGS Informatics</i>                         | <b>British Geological Survey</b><br><i>04/2019 – present</i> |
| • <b>Research Software Engineer</b><br><i>School of Geosciences</i>                      | <b>University of Edinburgh</b><br><i>11/2017 – 03/2019</i>   |
| • <b>Scientific Software Engineer</b><br><i>Modelling Infrastructure Support Systems</i> | <b>Met Office</b><br><i>03/2017 – 11/2017</i>                |
| • <b>Software Developer (PhD work placement)</b><br><i>Satellite Applications</i>        | <b>Met Office</b><br><i>06/2015 – 10/2015</i>                |
- 

## Education

- |   |   |
|---|---|
| • <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><i>2013 – 2017</i> |
| • <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><i>2009 – 2013</i>  |
- 

## Selected Community Roles

- |  |                       |
|--|-----------------------|
| • Software Carpentry Institute Certified Instructor    | <i>2018 – present</i> |
| • Reviewer – JOSS: The Journal of Open Source Software | <i>2016 – present</i> |
- 

## Highlighted Software Projects

- "NORRIS" - BGS Unified Groundwater Forecasting System

**Python (PyNetCDF, pytest):** Python developer and consultant to groundwater scientists. Implemented an automated system in Python to extract data from a variety of sources and pre-process for use in a groundwater forecasting model, used to produce the UK's daily and monthly Groundwater Flood Forecast and Hydrological Outlooks. Lead the test-driven development side of the project using Pytest, and the netCDF processing routines.

- **ETLHelper - Library for database Extract, Transform, Load routines in Python**

<https://github.com/BritishGeologicalSurvey/etlhelper>

**Python:** Co-developer on etlhelper, a library to simplify running a SQL query via Python and returning the results. It is built upon the DBAPI2 specification and takes care of importing drivers, formatting connection strings and cursor management. This reduces the amount of boilerplate code required to query a relational database with Python.

- **LISFLOOD model HPC parallelisation project**

<https://github.com/dvalters/hail-caesar>

**C++, OpenMP, MPI:** Co-Investigator/developer on project funded from two grants from UK National Super-computer program (ARCHER eCSE12-17 and eCSE13-21) 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.
- **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 and develop the statistical analysis tools (**C++**), visualisation and automation scripts (**Python**) for task-farming sensitivity analyses.

## 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)

## Teaching and Training Experience

- Training courses written and delivered - British Geological Survey 2019 – present
  - Introduction to Python for Geologists
  - Intermediate Python
  - Introduction to Version Control with Git
  - Organiser of fortnightly Python clinic help group
- 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 – 2019
  - Introduction to Fortran
  - Introduction to Python
  - Pandas for Data Analysis
- Teaching Assistant – University of Manchester 2013 – 2016
  - Fortran and Matlab for engineers - MSc course