Dr Declan A 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**
  Met Office Modelling Infrastructure Support Systems — *03/2017 – 11/2017*
- **Software Developer (PhD work placement)** — **Met Office**
  Met Office Satellite Applications — *06/2015 – 10/2015*

Education

- **PhD in Earth, Atmospheric, and Environmental Science** — **University of Manchester**
  Thesis: Modelling 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

- **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

  Development of the Cylc software package, a scientific workflow manager and scheduler.
  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

  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 specific role was to develop the statistical analysis tools (C++), visualisation (Python), 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**
  UK Research Software Engineers Network

Teaching roles and other service

- Workshops written and delivered - University of Edinburgh *2018 – present*
  Courses taught:
  - Introduction to Python
  - Pandas for Data Analysis
- Journal of Open Source Software – reviewer *2017 – present*
- Teaching Assistant – University of Manchester *2013 – 2016*

Grants and Awards

- ARCHER CSE Project Grant EPCC – 3 person months of software development awarded
- 5th Intel Xeon Phi Access Programme STFC, Hartree Centre – 4 months trial