PHILIPPA LIGGINS

PhD Candidate - University of Cambridge

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EXPERIENCE

Ph.D. Candidate in Earth Science
University of Cambridge

📅 Oct 2018 – 2022   ● Cambridge, UK

My thesis uses computation models to simulate the effect of volcanic gases on the evolution of atmospheres on the Early Earth and other planets. The results are used to interpret current and future observations, in the context of the search for extra-solar life.

- **Independently** developed 2 large Python-based models (integrating a C++ module) of volcanic systems and atmospheres, using agile methodologies in a Linux environment. Taught myself Python3 and some C++ with minimal prior coding experience.
- Handled large datasets, presented results at large international conferences (e.g., Goldschmidt, LPSC), published multiple papers.
- **Collaborated** with researchers both internally and at other institutions (Bristol, CalTech, GNS New Zealand), extensive experience in **technical writing**, to journal and conference deadlines.
- Participated in the 'Recipe for Primordial Life' exhibit for the 2019 Royal Society Summer Science Exhibition, communicating project science to the general public.

University teaching
University of Cambridge

📅 Oct 2018 – Dec 2022   ● Cambridge, UK

- Provide in-lab guidance for 3rd year undergraduate students.
- Taught Python programming, with a focus on applications in Earth Sciences using packages such as NumPy, Pandas and Cartopy.
- Helped provide updated example answers to independent coding exercises.

Camp counsellor & instructor
Wehakee Camp for Girls

📅 Summer 2017   ● Wisconsin, USA

- Pastoral mentor for children age 7-17. Worked in a number of small teams planning and leading activities such as sailing (lead instructor) and archery.
- Various responsibilities for the safety and well-being of campers as a fully qualified pool & open-water lifeguard.

Laboratory assistant
Lancaster University

📅 Summer 2015   ● Lancaster, UK

- Volunteered preparing geological field samples for geochemical analysis, resulting in an offer to continue in a paid position.

MOST PROUD OF

🏆 **Embiricos Trust Scholarship**
3 year fully funded Ph.D. studentship from Jesus College, Cambridge. Only one awarded each academic year.

</> **Building a program**
Writing a large thermodynamic Python model with <u>minimal</u> prior coding experience

♛ **Queen's Scout Award**
The highest award in Scouting, the culmination of years of volunteering and progressive learning

EDUCATION

Ph.D. Earth Science
University of Cambridge

📅 Oct 2018 – Sept 2022

Thesis title: The Atmospheric Fingerprints of Volcanism; Simulating volcanic outgassing and secondary atmospheres on rocky planets

M.Sci. Earth and Environmental Science (First class Honours)
Lancaster University

📅 Sept 2014 – June 2018

Graduating Top of Class (82%, with 91% average in Masters year) with awards including Best B.Sc. Dissertation and Best Performance in 1st, 2nd and 4th years.

Modules included *Life in a Changing Environment*; *Atmosphere, Weather and Climate II*; and *Quaternary Environmental Change*.
Masters level modules inc. *Geoinformatics* and *Data Analysis and Interpretation*.

A Level and GCSE
Holyrood Academy & 6th Form Centre

📅 2007 - 2014   ● Somerset, UK

A level: Maths (A*), Physics (A), Chemistry (A), Geography (A).

Achieved 100% in final Maths exam.

GCSE: 8 A*s and 4 As, inc. French.

SELECT PUBLICATIONS

📄 Published

- **Liggins, P.**, Jordan, S., Rimmer, P.B., and Shorttle, O. (2022). Growth and Evolution of Secondary Volcanic Atmospheres: I. Identifying the Geological Character of Hot Rocky Planets. *Journal of Geophysical Research: Planets*, 127(7), e2021JE007123.

- Yip, S.T.H, Biggs, J., Edmonds, M., **Liggins, P.** and Shorttle, O. (2022). Contrasting Volcanic Deformation in Arc and Ocean Island Settings due to Exsolution of Magmatic Water. *Geochemistry, Geophysics, Geosystems*, 23(7), e2022GC010387.

- **Liggins, P.**, Shorttle, O., and Rimmer, P.B. (2020). Can Volcanism Build Hydrogen-Rich Early Atmospheres? *Earth and Planetary Science Letters*, 550, 116546.

📄 Preprints

- Hughes, E.C., Saper, L., **Liggins, P.**, O'Neill, H.S.C., and Stolper, E.M. (In Press). The Sulfur Solubility Minimum and Maximum in Silicate Melt. *Accepted at the Journal of the Geological Society*.

- **Liggins, P.**, Jordan, S., Rimmer, P.B., and Shorttle, O. (In review). Growth and Evolution of Secondary Volcanic Atmospheres: II. The Importance of Kinetics. *Submitted to JGR: Planets*.

ACADEMIC PRESENTATIONS

Experience **communicating key findings** and complex concepts quickly and effectively. Selected presentations include:

🖥 Invited Talks

- **Liggins, P.** (2021). Volcanic Atmospheres on Rocky (Exo)Planets. *Manchester Geoscience Seminar Series*

👥 Conference Presentations

- **Liggins, P.**, Jordan, S., Rimmer, P.B. and Shorttle, O. (2022). The Fingerprints of Volcanism: Secondary Atmospheres on Rocky (Exo)Planets. *VMSG, Virtual*.

- - (2022). The Fingerprints of Volcanism: Secondary Atmospheres on Rocky Planets. *LPSC, Houston, Texas*.

- **Liggins, P.**, Rimmer, P.B. and Shorttle, O. (2021). Probing Mantle Redox with Planetary Atmospheres. *UKEXOM, Virtual*.

- - (2020). Can Volcanism build Hydrogen-Rich Early Atmospheres? *Goldschmidt, Virtual*.

INTERESTS & RESPONSIBILITIES

2020-21	Graduate Student mentor (Providing an point of contact for incoming PhD students during their first year).
2018-20	Jesus College, Women's 2nd & 3rd VIII rowing boat.
2016-18	Lancaster University Orienteering Society (Founding member and on the executive committee, as a Safety Officer and General Secretary).
2010-19	Scout Leader (Both as a young leader and an adult; helped run weekly meetings, assist on week and weekend camping trips. Also responsible for outreach and fundraising by interacting with parents, young people and the public).

TECHNICAL SKILLS

Programming languages

- Highly proficient in **Python** and have experience writing and integrating **C++**.
- Proficient using **MATLAB** and have some web development experience using HTML5.
- Confident with **LaTeX** markup language.

Software development

- Familiar with common design patterns and language features (incl. object orientation, advanced data structures).
- Extensive experience in both **Linux** (Ubuntu, WSL) and Windows operating systems.
- Experienced in source control using **Git**/**Mercurial**. Some experience with **HPC environments** (through NCAS training courses on the Met Office Unified Model) and knowledge of **machine learning** fundamentals.
- Experience utilising root-finding methods and implementing high-precision versions of common NumPy/SciPy algorithms (e.g., Newton-Raphson, Jacobian matrices) in MPFR.
- Familiarity **translating** Pascal code into Python and **packaging** code for release.

Data analysis and presentation

- Proficient working with large datasets, including Pandas/NumPy for manipulating tabular data and Matplotlib for visualisation.
- Experience using **SPSS** and **ArcGIS**.

SCHOLARSHIPS & AWARDS

2022	**Bob Hunter Prize (Honourable Mention)** For best oral presentation at VMSG
2018	**Embiricos Trust Scholarship** Scholarship for PhD funding
2018	**LEC Prize** For best academic achievement in a 4th year degree
2017	**Best BSc (Hons) Dissertation** Awarded for my dissertation titled "Analogue modelling the timeline of development for collapse calderas".

Other awards include Best overall 2nd year performance, the British Soil Science Award and Best overall 1st year performance.