

Jessica Lok

Fitzwilliam College, Storey's Way, Cambridge CB3 0DG | jhyl3@cam.ac.uk | Updated March 2024

EDUCATION (†denotes most recent result, see next page for list of courses†)

- 2021– **University of Cambridge, UK**, Natural Sciences Tripos BA/MSci
Expected graduation date: July 2025
- Part II Astrophysics (**current**) at the Institute of Astronomy (IoA)
 - † **Part IB, Class I overall: Mathematics (1), Physics (1), Solid Earth Sciences (1)**
 - *Elected to the Clough Scholarship*
 - Part IA, Class II overall: Mathematics (1), Physics (1), Earth Sciences (2.i), Chemistry (2.i)
- 2014–21 **South Island School, Hong Kong**
(2021) IB Diploma, 44/45, *ESF Chairman's Awards for Excellence*

RESEARCH AND LABORATORY EXPERIENCE

- 2023 Jul-Aug **Geological research internship at CASP.**
Supervised by Dr Michael Flowerdew.
- Trained on a Zeiss SEM and Oxford Instruments Ultim Max EDS detector including AZtec software. Used SEM imaging and EDS data to infer sediment source from samples collected along the Great Ouse Tidal River (GOTR). These conclusions were used alongside sediment fluid physics and tide arguments to investigate sediment transport in the GOTR. Other work involved SEM imaging and compositional data collection for carbon capture and storage projects investigating volcanoclastics and the Bunter sandstones as viable candidates for CO₂ injection, by characterising the porosity and mineralogy of these samples. Improved phase classification schemes for use in AZtec.
- 2022 August **Assistant in the Tosca Lab, Dept. Earth Sciences, Cambridge.**
Supervised by Peter Methley and Dr Clancy Jiang.
- Assisted PhD project investigating Amorphous Calcium Magnesium Carbonate (ACMC) as a potential precursor to dolomite formation. Designed system to synthesise ACMC and used Raman spectroscopy and x-ray diffraction to verify composition and investigate structure.
- 2022 July **Placement with Palaeoclimatology ice core group at the British Antarctic Survey.**
Supervised by Dr Diana Vladimirova and Dr Dieter Tetzner.
- Processed Antarctic ice cores and performed continuous flow analysis on ice core meltwater. Set up chemical standards for meltwater analysis. Analysed the distribution of insoluble particulate matter collected in meltwater filters via SEM images. Used Python to run Monte Carlo simulations to inform transect selection for future mineralogical analysis.

FIELD EXPERIENCE

- 2023 Aug-Sep **Geological mapping project in the Barrême Basin, Alpes-de-Haute-Provence, France.**
- Six-week independent mapping project funded by The Lord Mayor's Trust, Worts Travelling Scholars Fund, CASP, and Fitzwilliam College Cambridge. 10 km² area covering the eastern margin of a Tertiary thrust-sheet-top basin bounded by Cretaceous carbonate units.
- 2023 June **Geological mapping training in Ord, Skye. Supervised by Prof Mike Bickle.**
- 7-day supervised mapping project. Produced a bedrock geology map of the Ord Window, cross-section, and report.

COMPUTING EXPERIENCE

Python NumPy, SciPy, pandas, Matplotlib	<i>Coursework:</i> (i) Accretion discs: modelled a steady-state Keplerian axisymmetric disc (where angular momentum transport is caused by viscous torques) for the surface density profile and the evolution of particle orbits; (ii) Cosmological comoving volume (work in progress) <i>BAS placement:</i> Monte Carlo simulations to determine how many transects of an SEM scan of the filter should be sampled to give representative proportions of the types of particulate matter collected. Found that sampling 30-40% of the total number of transects was in most cases sufficient to reach >80% of the filter density. Matrix methods; ODE methods (Runge-Kutta, Adams-Bashforth); simple solid solution model.
Excel	Matrix methods, Sturm-Liouville theory (eigenfunction expansions), root-finding (Newton-Raphson), ODE methods, PDE relaxation methods (Jacobi, Gauss-Seidel).
QGIS	Basemaps for the mapping project; bathymetry analysis of the Fens for my CASP project.
<i>Others</i>	LaTeX, Bash, Adobe Photoshop, Adobe Premiere Pro, Da Vinci Resolve, Portfolio

TALKS AND PRESENTATIONS

2024 Feb [“Models of Pallasite Formation”](#), IoA Undergraduate Journal Club

INTERESTS Planetary physics: planet and meteorite formation, interior dynamics
Protoplanetary discs, element and material distribution
Mantle geophysics and metamorphic reactions

***COURSE LIST** Astrophysical Fluid Dynamics, Statistical Mechanics, Quantum Mechanics, Galactic Dynamics, General Relativity, Intro to Cosmology, Structure of Stars, Intro to Condensed Matter

Planetary Geochemistry & Materials, Igneous & Metamorphic Petrology, Structural Seismology

Mathematical Methods (including Sturm-Liouville Theory, Variational Calculus, Contour Integration, Transform Methods, Intro to Group Theory and Representation Theory)

EXTRACURRICULARS AND VOLUNTEER WORK

2022-24 **Secretary and Acting Chair (2023) of the Cambridge University Astronomical Society.**

Organise weekly astronomy talks given by researchers from the UK and abroad, host alumni events, and run public outreach events for observational astronomy. Facilitate relations between Society members, the Committee, and the IoA. Teach Society members how to use the historic Northumberland telescope, and regularly run observation nights. Assist at the IoA's weekly Public Open Evenings. Host observation nights in local communities around Cambridge.

2024-25 **Secretary of the Cambridge University Hillwalking Club.**

The Club organises weekend hiking trips to various locations around the UK. I plan and lead day hikes.

2023 Jan-May **STEM SMART mentor with Dept. Physics, Cambridge.**

STEM SMART is a programme supporting Y12 students from underprivileged backgrounds to improve science and maths skills. I organised and led fortnightly mentor sessions with a group of ~20 students, covering study and exam skills and university applications.