

Jessica Lok

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EDUCATION

- 2021–present **University of Cambridge, UK**, Natural Sciences Tripos MSci (expected to graduate July 2025)
- Year 4: Astrophysics, Institute of Astronomy**
Courses: Geophysics, Astrophysical Fluid Dynamics, Solid Earth Fluid Dynamics, Planetary System Dynamics, Dynamics of Astrophysical Discs, Inverse Problems
Research project: Investigating dust entrainment in protoplanetary disc winds.
Supervised by Prof Cathie Clarke.
- Year 3: Astrophysics, Class II.i, ranked 10th in cohort
- Year 2: Class I overall: Mathematics (1), Physics (1), Solid Earth Sciences (1)
Elected to the Clough Scholarship
- Year 1: 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 INDUSTRY EXPERIENCE

- 2024 Jun–present **Research internship, Space Plasma Physics group, QMUL.** Supervised by Dr Heli Hietala.
- Investigated plasma waves generated by satellites in low Earth orbit. Calculated satellite conjunctions from historical TLEs; processed spacecraft ephemeris, B-field and E-field data from Cluster, MMS and CASSIOPE missions.
 - Investigated proplyd bow shocks as a method to deduce proplyd inclinations.
- [GitHub Summary](#)
- 2024 Jul–Aug **Seismic imaging (geophysics) internship at CGG/Viridien.**
- Project processing multi-azimuth towed streamer seismic data of the North Sea.
 - Focus on pre-migration denoising of shot gathers using e.g. sparse inversion and deconvolution in various domains.
 - Presented results of denoise process to clients and acted on client feedback.
- 2023 Jul–Aug **Geological research internship at CASP.** Supervised by Dr Michael Flowerdew.
- Trained to use a scanning electron microscope (SEM) and EDS detector.
 - Imaged and collected mineralogical and petrophysical data of volcanoclastics and Bunter sandstones for CCS projects; improved phase classification schemes for EDS data.
 - Investigated sediment build-up in the Great Ouse Tidal River (GOTR); obtained mineralogy of sediment samples collected along the GOTR to infer source; investigated tidal bores as a mechanism of upstream sediment transport.
- [Summary](#)
- 2022 August **Assistant in the Tosca Lab, Dept. Earth Sciences, Cambridge.** Supervised by Peter Methley.
- Investigated Amorphous Calcium Magnesium Carbonate (ACMC) as a precursor to dolomite formation. Designed system to synthesise ACMC. Used Raman spectroscopy and X-ray diffraction to verify composition and investigate structure.
- 2022 July **Placement with Palaeoclimate group, British Antarctic Survey.** Supervised by Dr Dieter Tetzner.
- Processed Antarctic ice cores; performed continuous flow analysis on ice core meltwater; set up chemical standards for meltwater analysis.
 - Analysed the distribution of particulate matter collected in meltwater filters in SEM images. Ran Monte Carlo simulations to inform transect selection for future analysis.

FIELD EXPERIENCE

- 2023 Aug-Sep** **Geological mapping project in the Barrême Basin, Alpes-de-Haute-Provence, France.**
6-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 bedrock geology map, cross-section, and report.

COMPUTING EXPERIENCE

- Python**
github.com/frozenglobe
Obtained satellite data via HTTP requests from web services; parsed and processed CDF & HDF5 files. Performed FFTs on monopole data to extract field spectrograms. Propagated satellite orbits with simplified perturbation models and calculated satellite conjunctions from over 600,000 historical orbital element sets (TLEs).
Modelled steady-state axisymmetric accretion disc for the surface density profile, angular momentum transfer, and evolution of particle orbits through numerical PDE solving.
Calculated cosmological comoving & luminosity distances for a range of redshifts for different universe models; applied to $\langle V/V_{\text{max}} \rangle$ test for quasars.
Ran Monte Carlo simulations to determine the proportion of filter that should be sampled to give representative proportions of the types of particulate matter collected.
- 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; river bathymetry analysis for my CASP project.
- Others**
LaTeX, Bash, Adobe Photoshop & Premiere Pro, Da Vinci Resolve. [Portfolio](#)

TALKS AND PRESENTATIONS

- 2024 Sep** [“Searching for s/c-generated plasma waves with CLUSTER”](#), QMUL Space Plasmas group
- 2024 Feb** [“Models of Pallasite Formation”](#), Institute of Astronomy Undergraduate Journal Club

- INTERESTS**
Earth observation, ionosphere & magnetosphere structure & dynamics
Protoplanetary discs, material distribution & evolution, planet formation, interior dynamics

EXTRACURRICULARS AND VOLUNTEER WORK

- 2024-25** **Secretary of the Cambridge University Hillwalking Club.**
The Club organises weekend hiking trips to mountainous locations around the UK. Responsible for communications and day-to-day running of the Club. On trips, I plan and lead day hikes.
- 2022-24** **Secretary and Acting Chair (2023) of the Cambridge University Astronomical Society.**
Organised weekly astronomy talks given by researchers; taught Society members to operate telescopes; hosted observation nights in local communities. Facilitated relations between members, the Committee and the Institute of Astronomy. Assisted at public open evenings.
- 2023 Jan-May** **STEM SMART mentor with Dept. Physics, Cambridge.**
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.