Thomas Holland

Jesus College | Cambridge | CB5 8BL

37 Gerrans Hill | Truro, Cornwall | TR2 5EE

07878 853 931 | hello@thomasholland.uk | GitHub | LinkedIn

Profile

Cambridge computational scientist and software builder with experience in Bayesian inference, numerical simulation, inverse problems, and scientific tooling. I enjoy turning mathematical models into reusable code, diagnostics, and visualisation, and have learned most from projects that forced me to balance methods, computation, and clear experimental structure.

Skills

Technical areas

Languages

- Python
- Julia
- Rust
- Fortran
- Bash

Skills

- Git, CI
- Docker
- Jupyter
- Parallel computing
- Optimisation
- Scientific visualisation

Scientific areas

- Bayesian inference
- Inverse problems
- Data assimilation
- PDEs and SDEs
- Phase modelling
- Physics-informed Modelling

Projects

Improving Methods for Estimating Ice-Driven Sea Level Change using Bayesian Inference 2025–2026
GitHub | Report

MSci Dissertation (submitted May 2026) — Supervisor: Dr David Al-Attar
(First-class mark: 77.00/100)

- Developed infinite-dimensional, physics-informed Bayesian inversion for recovering ice-thickness change directly from satellite and ice altimetry
- Built Gaussian-prior structure with heat-kernel covariance and physically motivated priors to separate ice and firn contributions
- Extended framework to joint inversion over ice thickness, firn compaction, and ocean dynamic topography, using derived joint operator matrix factorisation to significantly reduce computational overhead in numerical modeling
- Implemented in Python using PySLFP and pygeoinf, validating robustness under synthetic twin experiments and prior misspecification

Camdram Connected 2026
GitHub

Self-directed web application

- Built a web app that shows how any two people in Cambridge theatre are connected, turning Camdram role data into shortest collaboration paths
- Built a static HTML/CSS/JavaScript app on Cloudflare Pages, using a Pages Function to proxy Camdram API requests and add CORS headers without introducing a build step
- Implemented a rate-limited, cache-backed breadth-first search over people and shows to find shortest collaboration paths while keeping external API usage under control
- Added debounced autocomplete, role-type filtering, shareable URL state, PNG export, and an interactive vis.js graph with step-by-step connection details

Bayesian Data Assimilation and Forecasting of Chaotic Fault Slip 2025–2026
Nonlinear Dynamics and Chaos — coursework and self-directed extension (First-class result) GitHub | Report

- Built a Julia pipeline for exact Bayesian filtering, Rauch–Tung–Striebel smoothing, and forecasting for a chaotic spring-slider fault model on a 50^3 state-space grid
- Implemented custom grid-based posterior propagation by backward integration with Jacobian tracking, avoiding linearisation and ensemble approximations
- Evaluated calibration and forecast skill against persistence baselines under deterministic and stochastic variants, showing hidden-state noise could dominate predictive performance
- Refactored the workflow into staged compute jobs, threaded grid operations, and reusable plotting code for easier reruns and inspection

Seismic Wave Forward Modeller 2025
Self-directed GitHub

- Built a Rust tool for 2D elastic wave propagation using staggered-grid finite differences with harmonic interface averaging across material boundaries
- Parallelised time-stepping with Rayon and structured experiments through TOML configuration with CFL-safe timestep selection for repeatable runs without code changes
- Added multi-source injection, divergence/curl visualisation, and per-step energy diagnostics for debugging and analysis

Stochastic Dual Limit Cycle Attractor 2026
Self-directed GitHub

- Built a Julia model of a 2D Itô SDE with two stable limit cycles and rare noise-driven transitions between them
- Solved the associated Fokker–Planck equation on a Cartesian grid with conservative upwind advection, central-difference diffusion, explicit RK4 time-stepping, and threaded RHS evaluation
- Added event-driven transition detection and asynchronous snapshot rendering to compare trajectories with evolving densities

Geological Mapping and Structural Inversion 2024–2025
BA Research Project

- Built a Python optimisation workflow to recover fold geometry from field orientation data collected during geological mapping in the Iberian Central System
- Implemented multi-start L-BFGS-B fitting with Rodrigues-rotation updates and stereonet diagnostics; recovered fold geometry matched field observations and validated the mapping and inversion workflow

Education

University of Cambridge *2025–2026*
MSci in Earth Sciences (II.i, 67/100)
Dissertation: Bayesian inversion for sea-level and ice-sheet signals. Focus on geophysics and computational methods, with additional study in dynamical systems and chaos, seismology, palaeontology, major palaeo-environmental change, and critical mineral resources.

University of Cambridge *2022–2025*
BA in Natural Sciences
Part II Earth Sciences, including field project, petrology, geophysics, and ancient life and environments. Earlier years combined Earth Sciences with plant sciences, biology, evolution, and mathematical biology.

Experience

Cambridge University Astronomical Society 2025–2026
Webmaster and Membership

· Led a WordPress-to-Astro website migration, set up Cloudflare-based hosting, and streamlined the membership pipeline to reduce admin overhead and make updates easier for non-technical contributors

Jesus College Boat Club 2023–2025
Treasurer

· Managed a budget of over £100,000, handled forecasting across teams, and worked with college stakeholders on a structural financial reorganisation, which strengthened my sense for operational constraints around technical work