KENZA TAZI

PhD Student
University of Cambridge & British Antarctic Survey

kt484@cam.ac.uk
https://kenzaxtazi.github.io/

EDUCATION

University of Cambridge, MRes + PhD Environmental Data Science 2019-2025

PhD thesis: *Predicting precipitation over High Mountain Asia using Gaussian processes*

- Focused on improving historical and future precipitation estimates for the 1.9 billion people who rely on these mountains for **water security**. In particular, modelling the probability of extremes events that lead to floods and droughts.
- Applied wide range of **deep learning** models including convolutional neural networks and neural processes and developed novel Gaussian process models, including **climate model emulators**.
- Used a large range of **hydrological datasets**, including weather station data, satellite observations, reanalysis and climate model outputs.
- Supervised by Richard Turner (Uni. of Cambridge), Scott Hosking (Alan Turing Institute), Andrew Orr (British Antarctic Survey) and Javier Gonzalez (Microsoft).

MRes thesis: *Precipitation prediction in the Upper Indus Basin using Gaussian processes*
Probabilistic machine learning model for future precipitation predictions in key area for Pakistani, Indian, and Chinese water security.

Imperial College London, MSci Physics 2015-2019

MSc thesis: *Cloud identification in satellite images using artificial intelligence*
Deep learning model to improve cloud identification for Sentinel 3 satellites by over 30% over polar regions where clouds are most important to global radiation forcing and most challenging to identify.

BSc thesis: *Modelling the behaviour, occurrence and emissions of wildfire on a global scale*

ADDITIONAL RESEARCH EXPERIENCE

Frontier Development Lab 2022

- Led team of PhD students and post-doctoral researchers to study pyroCb clouds associated with the most intense and unpredictable wildfires with support from Google, NVIDIA, and the European Space Agency.
- Created the first global pyroCb database and machine learning forecasting system and conducted causal invariance modelling to better understand pyroCb drivers.

Geophysical Fluid Dynamics Group, University of Oxford 2018

- Investigated the 2016 stalling of the Quasi-Biennial Oscillation through laboratory experiments.
- Designed framework to simultaneously run twelve motors in different wave patterns to generate pseudo-gravity waves in a water filled annulus and analysed footage of the waves using particle image velocimetry.

Planetary Science Group, University of Oxford 2017

- Designed and built a light source for evaluating three-dimensional thermal emissions from lunar and asteroid samples with a cooling system.
- Built electronic interface to move two-axis platform and measured performance of light source and radiometer.

British Antarctic Survey, Cambridge 2016

- Wrote program to calculate diurnal and nocturnal cloud cover for wide field cameras using model simulations, image analysis, multi-coordinate system mapping.

- Software deployed at the Halley and Rothera bases in Antarctica and used for microphysical cloud property and gravity wave research.

AWARDS

Best student precipitation presentation award, AGU23	2023
First place in Cambridge ICCS Reproducibility Hackathon	2022
AJ Pressland Fund, University of Cambridge	2022
AI for Earth Grant, Microsoft (USD25,000)	2021
AI for Environmental Risk (AI4ER) CDT Studentship	2019
Stevenson Award, Imperial College London	2019
Student Award for Outstanding Achievement, Imperial College London	2019
Dean's Fund, Imperial College London	2018
Royal Astronomical Society Grant	2018

PUBLICATIONS

* presented at international conference

Tazi K, Kim SWP, Girona-Mata M, Turner RE. (2025). Refined climatologies of future precipitation over High Mountain Asia using probabilistic ensemble learning. Submitted to *Environmental Research Letters*. *

Tazi K, Orr A, Hosking JS, Turner RE (2025). Precipitation prediction over the Upper Indus Basin from large-scale circulation patterns using Gaussian Processes. Accepted in *Environmental Data Science*. *

Tazi K, Orr A, Hernandez-González J, Hosking JS, Turner RE (2024). Downscaling precipitation over High Mountain Asia using Multi-Fidelity Gaussian Processes: Improved estimates from ERA5. *Hydrology and Earth System Science*. *

Tazi K, Lin JA, Viljoen R, Gardner A, John T, Ge H, Turner RE (2023). Beyond intuition, a framework for applying Gaussian Processes to real-world data. In *ICML 2023 Workshop on Structured Probabilistic Inference and Generative Modelling*. *

Tazi K, Salas-Porras ED, Braude A, Okoh D, Lamb KD, Watson-Parris D, Harder P, Meinert N (2022). Pyrocast: A machine learning pipeline to forecast pyrocumulonimbus (pyroCb) clouds. In *NeurIPS 2022 Workshop Tackling Climate Change with Machine Learning*. *

Salas-Porras ED, **Tazi K**, Braude A, Okoh D, Lamb KD, Watson-Parris D, Harder P, Meinert N (2022). Identifying causes of Pyrocumulonimbus (PyroCb). In *NeurIPS 2022 Workshop on Causality for Real-world Impact*. *

Lalchand V, **Tazi K**, Cheema TM, Turner RE, Hosking JS (2022). Kernel Learning for Explainable Climate Science. In *UAI 2022 Workshop on Bayesian Modelling Applications*. *

Poulsen C, Egede U, Robbins D, Sandeford B, **Tazi K**, & Zhu T. (2020). Evaluation and comparison of a machine learning cloud identification algorithm for the SLSTR in polar regions. *Remote Sensing of Environment*.

TEACHING

Lecturer

- Gaussian processes in practice, NERC Bayesian Machine Learning as a Tool for Climate Scientist Workshop (2024)
- FAIR data practices, AI4ER CDT (2020, 2021, 2022, 2023)

Workshop organiser

- Weekly pair programming sessions for AI4ER CDT students (2021-2025)
- University of Cambridge 'Stochastic Processes Workshops' to collaborate on applications to real-world problems (2021, 2023)

Supervisor

- Small group problem sheet supervisions for the Department of Engineering's Inference course (3F8, 2025)
- Example classes for AI4ER CDT students auditing Advanced Machine Learning (MLMI4, 2022) and Machine Learning & Bayesian Inference (Part II, 2023)
- Supervision and assessment of students undertaking their 3rd year projects for the Department of Engineering. Topics ranged from civil, mechanical, information and bioengineering (2021, 2022, 2023)

Tutor

- Private tutoring with a focus on maths, computer science and physics at high school and undergraduate level (2018-2022)

INVITED TALKS

Precipitation prediction from over the Upper Indus Basin using Gaussian processes
The Alan Turing Institute, *Environment & Sustainability Seminar Series* Oct 2024

Ensembling climate models with Gaussian processes to better predict future extremes
University of Leeds, *SciML Seminar Series* Oct 2024
University of Cambridge, *Atmospheric Chemistry Group* Oct 2024
AGU, *Precipitation Technical Committee Seminar* Mar 2024

Improving precipitation predictions over High Mountain Asia using Gaussian processes
University College London, *Environment and Sustainability Group* Jul 2024

Narrowing precipitation uncertainty over High Mountain Asia using probabilistic ML
Shanghai AI Lab, *Lu Group* May 2024
MILA – Québec AI Institute, *Rolnick Group* Apr 2024
NERC Bayesian Machine Learning for Climate Scientists Workshop Mar 2024
NASA Jet Propulsion Laboratory, *SUDS Seminar* Dec 2023
Morocco AI, *Research Webinar Series* Jul 2023
University of Cambridge, *Energy and Environment Group* Jun 2023

Gaussian processes in practice
NERC Bayesian Machine Learning for Climate Scientists Workshop Mar 2024

Pyrocast: A machine learning pipeline to forecast pyrocumulonimbus clouds
University of Cambridge, *AI for Environmental Risk CDT* Nov 2022

CONFERENCES

Climate Informatics (talk) 2024
AGU Fall Meeting (poster and talk) 2023
ICML – Probabilistic Inference & Generative Modelling Workshop (poster) 2023
AI for Environmental Risk CDT showcase (talk) 2023
NeurIPS– Tackling Climate Change with AI Workshop (poster) 2022
Climate Informatics (poster) 2022
Lunar and Planetary Science Conference (poster) 2018

ACADEMIC SERVICE

Programme leadership
High Mountain Data Co-Lead for the Himalayan University Consortium (2023-2025)

Outreach

- BCG 'Climate and Sustainability Stewardship' Programme (2022-2024)
- She Talks Science Webinar (2021, 2023)
- Raspberry Pi magazine: Hello World (2022), Issue 19: Sustainability & Computing
- Rocket Seeds - see Fernando B, Wade J, Tazi K. (2016) Sowing seeds from space. Astronomy & Geophysics. 2016 Oct 1;57(5):5-11

Reviews: Climate Informatics; ICML – Structured Probabilistic Inference and Generative Modelling Workshop; Journal of Geophysical Research - Atmospheres

Committees

- AI4ER CDT Management Committee (2021-2023)
- AI4ER CDT Ethics Diversity and Inclusion Committee (2022-2023)
- Undergraduate Student Staff Committee, Department of Physics, Imperial College London (2016-2017)
- University Student Network Executive Committee, Institute of Physics (2016-2017)

POLICY

Polar Summit, Paris Peace Forum, invited delegate 2023
Worked collectively with other scientists to secure EUR 1 billion pledge towards polar and high mountain research from French government.

Cambridgeshire County Council, consultant 2020-2021
Undertook research for the Council through the Cambridge University Science and Policy Exchange (CUSPE) creating the Cambridgeshire Decarbonisation Fund, a new policy framework to decarbonise the county by 2050.

All Party Parliamentary Group on Air Pollution, lead author 2020
Guided a small team to submit evidence on ways to keep low air pollution levels as UK exited the first Coronavirus Lockdown. Measures including making temporary cycle and pedestrian lanes were implemented.

Tsinghua University's Environment Summer School, invited delegate 2017
Imperial delegate sent to design and pitch policy project to overcome one of China's environmental challenges to leading academics and policymakers.

OTHER EXPERIENCES

EntrepriseTech, University of Cambridge 2020-2021
Led team to propose business plan for a drug-discovery start-up with mentorship from the Head of Strategy to the VP of Artificial Intelligence at AstraZeneca Cambridge.

Science Museum, London 2018-2019
Advised curators on instrument displays and public engagement for the 'London: City of Science' permanent exhibit.

Winter Olympic Games, Sochi 2014
Represented Morocco in the Women's Alpine Skiing Giant Slalom and Slalom events and competed in international circuits (FIS races, South America Cup and French Cup).

LANGUAGES

English and French (fluent), Korean (TOPIK Level 3), German (prev. C1)

Python (incl. TensorFlow, PyTorch, Jax), Julia, MATLAB, Arduino, R, HTML, CSS

OTHER SKILLS

Cloud and high-performance computing, manufacturing and graphic design training