Institute of Computing for Climate Science

SUMMER SCHOOL

JULY 10-12, 2024 | CAMBRIDGE, UK

Schmidt Sciences

Institute of Computing for Climate Science

UNIVERSITY OF CAMBRIDGE

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Welcome

Dear Colleagues,

Welcome to the third annual ICCS Summer School! ICCS is proud to host the summer school again in Cambridge, a vibrant, modern city with a colourful history, and we hope you will be able to enjoy much of what Cambridge has to offer this week.

This year we have a shorter programme, just 2.5 days, compared to 4-5 days in the past, owing to the Cross-VESRI convening prior to the summer school. However, this year we also have increased parallelism, with two tracks of workshops catering for different levels of skill, knowledge, experience, and interests. In addition to providing training, we hope the summer school will be a great opportunity to forge collaboration, share knowledge and accelerate research progress.

Throughout there will also be the opportunity to sit down and discuss with the ICCS RSE team, for example, to have focussed time to discuss existing projects and collaborations, or to generally get help on any software issues currently faced.

On behalf of everyone making the summer school possible, thank you for joining us and enjoy your time in Cambridge!

Emily Shuckburgh, **Colm-cille Caulfield**, **Chris Edsall**, **Dominic Orchard** and **Marla Fuchs**
ICCS Directorship

Programme at a Glance

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<tr><th>Time</th><th>Wednesday, July 10</th><th>Thursday, July 11</th><th>Friday, July 12</th></tr>
<tr><td>8:15 - 9:00</td><td rowspan="5"></td><td colspan="2">Continental breakfast @CMS
(Core area) 8.15 – 9.00</td><td colspan="2">Continental breakfast @CMS
(Core area) 8.15 – 9.00</td></tr>
<tr><td>9:00 - 10:30</td><td>Intro to Neural Networks with PyTorch (MR2)</td><td>Coupling PyTorch with Fortran via Ftorch (MR4)</td><td>Intro to climate and weather modelling (beginner) – (MR2)</td><td>Explainable data science with the Fluid language (MR4)</td></tr>
<tr><td>10:30 - 11:00</td><td colspan="2">Break (tea and coffee - Core Area)
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<tr><td>11:00 - 12:00</td><td>Intro to Neural Networks with PyTorch contd. (MR2)</td><td>Code clinic (MR4 and 5)</td><td>Intro to climate and weather modelling (beginner) contd. (MR2)</td><td>What can abstract math's tell us about programming climate models? (advanced) (MR4)</td></tr>
<tr><td>12:00 - 13:30</td><td colspan="2">Lunch @ Churchill College
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12.00 -13.30</td></tr>
<tr><td>13:30</td><td colspan="2">Arrival at CMS</td><td rowspan="3">OpenMP for GPUs (MR4)</td><td rowspan="3">Research Software Engineering with Python (MR2)</td><td rowspan="3">Profiling and performance testing (MR2)</td><td rowspan="3">Introduction to Computational Science in Julia (MR4)</td></tr>
<tr><td>14:00</td><td colspan="2">Welcome – Stu Feldman (MR2)</td></tr>
<tr><td>14:15</td><td rowspan="2">Intro to Git and GitHub for Beginners (MR4)</td><td rowspan="3">Intermediate Git and GitHub (MR2)</td></tr>
<tr><td>15:00</td><td colspan="2">Break (tea and coffee - Core Area)
15.00 – 15.30</td></tr>
<tr><td>15:30</td><td rowspan="3">OpenMP for GPUs (lab) – (MR4)</td><td rowspan="3">Typing Python with mypy (MR2)</td><td colspan="2">Break (tea and coffee - Core Area)
15.30 – 16.00</td></tr>
<tr><td>15:45</td><td colspan="2" rowspan="2">Break (tea and coffee - Core Area)
15.45 – 16.15</td></tr>
<tr><td>16:00</td><td colspan="2">Closing Keynote -
Transformational power of openness: open source in research and beyond
Evelina Gabasova (MR2)</td></tr>
<tr><td>16:15</td><td rowspan="2">Scientific Visualisation (MR2)</td><td rowspan="2">Code clinic (MR4 and 5)</td><td colspan="2" rowspan="2">Transport to Madingley Hall will depart from CMS between 17.15- 17.45.
Return transport will depart Madingley Hall at 22.00</td><td colspan="2" rowspan="2">Wine tasting, cheese and nibbles (Core area)</td></tr>
<tr><td>17:00</td></tr>
<tr><td>17:45</td><td colspan="2" rowspan="2">Pizza and beer plus board games / Lego (Core area)
17.45 – 20.00</td><td colspan="2" rowspan="2">Pre-dinner drinks reception and dinner (Madingley Hall)</td></tr>
<tr><td>18:00 - 22:00</td></tr>
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Detailed Programme and Abstracts

Wednesday, July 10 | *Centre for Mathematical Sciences*

Time	Description
13:30 - 14:00	**Arrival at Department of Applied Mathematics and Theoretical Physics (DAMTP), Centre for Mathematical Sciences (CMS), Wilberforce Rd, Cambridge, CB3 0WA** *Please be seated by 2pm in MR2*
14:00 - 14:15	**Welcome and Introduction *(MR2)*** *Stu Feldman, Schmidt Sciences*
14:15 - 15:45	**Track 1 Introduction to Git and GitHub *(MR4)*** *Marion Weinzierl, ICCS* *Amy Pike, ICCS* *James Emberton, ICCS* This session is aimed to help participants in taking their first steps with version control using Git and Github. We will learn the basic principles of Git, how we can upload our code (or other data) to a remote repository, collaborate on it with colleagues, receive their changes, go back to previous versions, etc. No more emailing files forth and back, no more "version5.78_final_final_use-this-one"! This is a hands-on session with live-coding and exercises. We will use the Unix shell in this course. Previous experience with using the shell would be helpful, but we will help you out if you haven't used it before.
14:15 - 15:45	**Track 2 Intermediate Git and GitHub *(MR2)*** *Joe Wallwork, ICCS* *Tom Meltzer, ICCS* This session is intended for participants who want to expand their understanding of Git and GitHub. Building on the basic principles of Git (e.g., the commit, pull, and push commands), we will explore the concept of branching, when to use it, and useful tools for interrogating and manipulating branches. We will also learn about the core concepts of GitHub, how they interact, and how they can be used to build effective software development workflows. This is a hands-on session with live-coding and exercises. We will use the Unix shell in this course.
15:45 - 16:15	Break (tea and coffee)
16:15 - 17:45	**Track 1 Scientific Visualisation *(MR2)*** *James Emberton, ICCS* *Jack Atkinson, ICCS* In this session we will look at viewing scientific data using python tools. We will cover how to open and access large datasets and prepare them for plotting - e.g. with xarray and (geo)pandas. We will look at libraries that are useful for plotting geospatial data such as cartopy, regionmask, cmocean. As well as technical skills we will discuss considerations for presenting data such as use of scales, colourmaps, and labelling. Finally, we will look at examples of structuring matplotlib code for streamlining presentation and enabling easy re-use.
16:15 - 17:45	**Track 2 Code clinic *(MR4 and MR5)*** A chance to meet with ICCS RSEs
17:45 - 20:00	Pizza, beer and board games/Lego *(Core area)*

Thursday, July 11 | *Centre for Mathematical Sciences*

Time	Location
08:15 - 09:00	**Continental breakfast at the CMS *(Core area)***
09:00 - 10:30	**Track 1 Introduction to Neural Networks with PyTorch *(MR2)*** *Matt Archer, ICCS* *Surbhi Goel, ICCS* This session aims to teach the key theoretical concepts behind machine learning and offers hands-on training in applying machine learning techniques using PyTorch, along with guidance on structuring resilient and sustainable machine learning code. We will cover both regression and classification, learning about key concepts and applying them in parallel exercises. Once complete participants will have a good framework for building, training, and running neural nets that could be adapted for their own applications. We will demonstrate the application of machine learning with examples from the geoscience domain. Required Pre-Reading: To make the most of the session we expect participants to arrive with a (minimal) base-level understanding of machine learning concepts. In addition to this we will also assume knowledge of some basic mathematics and python abilities.
09:00 - 10:30	**Track 2 Coupling PyTorch with Fortran via FTorch *(MR4)*** *Jack Atkinson, ICCS* A key focus of many scientific computing domains at present is how to use machine learning to enhance and accelerate traditional simulations. Climate science is no exception, with this topic being part of all VESRI projects. To achieve coupling between ML and numerical models presents a number of technical and scientific challenges, however. FTorch (https://github.com/Cambridge-ICCS/FTorch) is a library developed by ICCS to couple PyTorch-based machine learning models to Fortran code with the aim of reducing the burden on scientific researchers. It has already been used in DataWave and M2LInES projects and further afield. In this workshop we will introduce FTorch and review its capabilities before taking participants through the process of coupling a PyTorch model into a Fortran code bin a practical demonstration. There may also be time for questions/discussion from those seeking to use FTorch in their work, and the developers will be available for code-clinics and discussions throughout the week.
10:30 - 11:00	Break (tea and coffee)
11:00 - 12:00	**Track 1 Introduction to Neural Networks with PyTorch continued *(MR2)*** *Matt Archer, ICCS* *Surbhi Goel, ICCS* Following-on from the previous session.
11:00 - 12:00	**Track 2 Code clinic *(MR4 and MR5)***
12:00 - 13:30	Lunch *(Churchill College)*

Thursday, July 11 *(continued)* | *Centre for Mathematical Sciences*

Time	Location
13:30 - 15:00	**Track 1 OpenMP for GPUs *(MR4)*** *Chris Edsall, ICCS* *Arjen Tamerus, Zettascale Lab* To make the best use of today's massively parallel and heterogeneous (both CPU and GPU) computing resources we need to use several programming models. OpenMP is an open specification for a directive-based programming model that can take advantage of all the cores on a processor and offload computations to GPUs making only minimal changes to the C, C++ or Fortran source code. This session will serve as an introduction to the OpenMP programming model for GPU acceleration. You will learn how to introduce the directives into your code, and put this into practice using OpenMP to speed up example programs.
13:30 - 15:00	**Track 2 Research Software Engineering with Python *(MR2)*** *Jack Atkinson, ICCS* *Marion Weinzierl, ICCS* Python is the tool of choice for many applications in research, from data processing and analysis to producing plots and figures for publications. However, much of this code is written to a base standard to achieve a single goal. Further, it is often written in a fluid style as interesting science appears. Whilst this is fast in the short-term, it does not lend well to re-usability by others (or even the future author!) or to well-written and structured code. In this session we will explore a number of tools and techniques that can be easily applied to improve your code's quality, readability, reduce bugs, and facilitate re-use.
15:00 - 15:30	Break (tea and coffee)
15:30 - 17:00	**Track 1 OpenMP for GPUs (lab) continued *(MR4)*** *Chris Edsall, ICCS* *Arjen Tamerus, Zettascale Lab* Following-on from the previous session.
15:30 - 17:00	**Track 2 Typing Python with mypy (MR2)** *Dominic Orchard, ICCS* Many compiled languages include a 'type checker' as part of their compilation process which applies automated checks to source code to rule out potential runtime errors due to mismatches in the format of data ('type errors'). The Python language does not include such a check: its types are 'dynamic', with type errors occurring only if encountered at runtime. Python however supports type annotations (since Python 3.0) which allows a programmer to insert optional type information into code which external tools can then use to type check a program. This session will teach how to use Python types alongside the mypy tool for ruling out program bugs and better documenting source code. We will also talk about some fundamental concepts in typing and program verification.
17:15 - 17:45	Transport to Madingley Hall will depart from CMS
18:00 - 22:00	**Pre-dinner drinks reception and dinner at Madingley Hall** Return transport will depart Madingley Hall at 22:00

Friday, July 12 | *Centre for Mathematical Sciences*

Time	Location
08:15 - 09:00	**Continental breakfast at the CMS *(Core area)***
09:00 - 10:30	**Track 1 Introduction to climate and weather modelling (MR2)** *Pier Luigi Vidale, University of Reading* *Anna Denvil-Sommer, University of Reading* This session will include a general lecture to explain what the current approach to weather and climate modelling is, and how it links to supercomputing. This will be followed by a short practical session using a pre-built model, with some tasks via a Jupyter Notebook. 1. Fundamentals of dynamics and physics for the atmosphere and ocean 2. Numerical methods used in weather and climate prediction 3. The supercomputing challenges in weather and climate simulation 4. Aspects of Machine Learning ○ ML emulators ○ Improvement of parameterizations ○ Uncertainty quantification ○ ML techniques for operational weather forecast The practical session will be based on Observation System Simulation Experience for ocean surface pCO2 over the Atlantic Ocean. Sparse data coverage and the lack of observations covering the full seasonal cycle challenge mapping methods and result in noisy reconstructions of surface ocean pCO2 and disagreements between different models. We will explore design options for a future augmented Atlantic-scale observing system that will optimally combine data streams from various platforms and contribute to reducing the bias in reconstructed surface ocean pCO2 fields and sea–air CO2 fluxes.
09:00 - 10:30	**Track 2 Explainable data science with the Fluid language (MR4)** *Roly Perera, ICCS* *Achintya Rao, ICCS and University of West of England* Charts and other visual summaries, curated by journalists and scientists from real-world data and simulations, are how we understand our changing world and the anthropogenic sources of that change. But interpreting these visual outputs is a challenge, even for experts with access to the source code and data. Fluid (f.luid.org) is a new "transparent" programming language, being developed at the Institute of Computing for Climate Science in Cambridge, that can be used to create charts and figures that are linked to data so a user can interactively discover what visual elements actually represent. This is an opportunity to learn about a new programming language in the making, designed to make climate science more open, intelligible and accessible.
10:30 - 11:00	Break (tea and coffee)
11:00 - 12:00	**Track 1 Introduction to climate and weather modelling continued *(MR2)*** *Pier Luigi Vidale, University of Reading* *Anna Denvil-Sommer, University of Reading* Following-on from the previous session with more time for practical work.
11:00 - 12:00	**Track 2 What can abstract mathematics tell us about programming climate models? *(MR4)*** *Dominic Orchard, ICCS*

Category theory is a subfield of mathematics that seeks to expose common underlying structure in other areas of mathematics. It has since also become a foundational technique for understanding logic and programming, with its use both in semantics of formal languages and as a tool for structuring programs. Many concepts in computer programming can be explained from a category theoretic perspective, yielding new insights about how to reason about programs and generalise their definitions. In this session, I will give an overview of a few key ideas that have applications to numerical programming tasks familiar in earth systems modelling. This will provide some fresh perspectives about how to structure and reason about programs both for correctness and efficiency.

Friday, July 12 *(continued)* | *Centre for Mathematical Sciences*

Time	Location
12:00 - 13:30	Lunch *(Churchill College)*
13:30 - 15:30	**Track 1 Profiling and performance testing *(MR2)*** *Tom Meltzer, ICCS* *Marion Weinzierl, ICCS* Have you ever found yourself in a position where your code feels slow but you can't quite put your finger on it? ● Is it the new system you're running on? ● the new dependencies installed by your system admin? ● or, that new awesome feature you pushed to the main branch last week? Climate software is necessarily complex, often containing thousands of source files and millions of lines of code. These projects are often developed collaboratively by a large number of scientists over a significant number of years. It is no longer possible to know every line of code, every function and every source file. We can no longer "just guess" where performance is being lost. This is where profiling comes in. In this tutorial we will cover the basics of profiling - what it is, what it's used for and how to understand the output. There will be hands-on demonstrations of a selection of tools for profiling compiled languages (C/C++/Fortran) and Python. We will also provide a quick introduction into memory profiling with valgrind and address sanitizers.
13:30 - 15:30	**Track 2 Introduction to Computational Science in Julia *(MR4)*** *Tianzhang Cai, ICCS* *Dominic Orchard, ICCS* This introductory tutorial provides a comprehensive overview of the core features and capabilities of the Julia programming language, designed for participants with a foundational understanding of programming concepts. We begin with an introduction to Julia and the interactive Pluto Notebook environment, followed by an exploration of functions, primary and composite data types, generic programming through multiple dispatch, and more. Afterwards, the tutorial provides several study cases to delve into applications of Julia in scientific computing and machine learning. The last part will be a hands-on lab to build an Earth energy balance model and train a neural network to solve its differential equation.
15:30 - 16:00	Break (tea and coffee)
16:00 - 17:00	**Closing Keynote – Evelina Gabasova *(MR2)*** Transformational power of openness: open source in research and beyond (see over the page for the abstract).
17:00 - 20:00	Wine tasting with Cambridge Wine Merchants, cheese and nibbles *(Core area)*

Keynote

Transformational Power of Openness: Open Source in Research and Beyond

Dr Evelina Gabasova, *Principal Research Data Scientist at The Alan Turing Institute*

Date/time: Friday 12th July, 4:00 — 5:00pm

Abstract

Building software tools has become a fundamental aspect of many areas of current research, from environmental modelling to digital humanities. Evelina will talk about how the potential of these tools can be amplified through the principles of open source and open science. Looking at successful and not so successful examples, we will explore the current landscape of open source in academia and research in general: from building collaborative communities to the current struggles to define what open source even means in the world of large language models. On top of that, we will cover some of the best practices for creating robust, reusable and openly accessible tools to maximise the impact of our research work.

Speaker profile

Evelina is a Principal Research Data Scientist at The Alan Turing Institute, where her work focuses on open-source activities in the research engineering group and the wider Institute. She is involved in a number of projects that are looking at real-world uses of artificial intelligence and machine learning, ranging from automation in air traffic control to enabling healthcare research on multiple long-term conditions.

Evelina has a background in computer science, machine learning and statistics. She completed her PhD from the University of Cambridge where she developed new statistical methods to analyze complex biomedical datasets. As a Research Associate at the MRC Cancer unit in Cambridge, Evelina created infrastructure to help biologists analyse genomic data, before moving to The Alan Turing Institute in 2018.

Outside of academia, Evelina is a passionate advocate for making data science understandable and accessible to everyone and is an avid speaker at developer conferences. In 2019 Evelina was awarded the Microsoft Most Valuable Professional award for her work in the F# community. In 2022, Evelina became Vice President of the Society of Research Software Engineering.

Logistical Information

Venues

A map of all venue/accommodation locations can be found on the 2024 ICCS Summer School webpage (https://cambridge-iccs.github.io/summerschool24).

Contacts

Email contact during the summer school: iccs@maths.cam.ac.uk

Slack

We have created a channel for virtual announcements and networking on Slack. This is where we will make announcements throughout the week.

Code of Conduct

The open exchange of ideas and the freedom of thought and expression are central to the aims and goals of the summer school; these require an environment that recognizes the inherent worth of every person and group, that fosters dignity, understanding, and mutual respect, and that embraces diversity. We are dedicated to providing a safe, hospitable, productive, and harassment-free and discrimination-free environment for everyone attending, regardless of ethnicity, religion, disability, physical appearance, gender, or sexual orientation. In particular, we expect all the participants to use welcoming and inclusive language, to be respectful of differing viewpoints and experiences, to gracefully accept constructive criticism, to focus on what is best for the community, and to show empathy towards other community members. We expect everyone to communicate openly with respect and consideration for others, treating each other as equals. It is important to remember that a community where people feel uncomfortable or threatened is neither healthy nor productive.

There is no tolerance for unwelcome, hostile, or disruptive behaviour or speech that intimidates, creates discomfort, or interferes with a person's participation or opportunity for participation at the event. Participants asked to stop any harassing behaviour are expected to comply immediately. Participants violating these standards may be expelled from this and future events.

If you witness or are subject to unacceptable behaviour, please talk to one of the ICCS leadership: Dominic Orchard or Marla Fuchs.

Travel

Please see our travel information on the 2024 ICCS Summer School webpage for travelling to/from the summer school via air, train and coach.

Travel from Cambridge Train Station

There is a taxi rank outside the main Cambridge station and buses run frequently between the station and city centre (to/from Emmanuel Street/St Andrew's Street). The 'Universal' bus service route (see above) also picks up/ sets down at Cambridge train station.

Accommodation

Attendees who have requested accommodation should have received an e-mail from the Schmidt Sciences team with the information they need.

Catering

Catering is fully vegetarian for the Summer School. Those who submitted further dietary requirements during registration will be catered for.

Staff

Staff and volunteers will be wearing red staff lanyards to identify themselves. Please ask them for any help.

Arrival on July 10

If you're arriving on Wednesday, July 10, we will supply spaces for you to leave your bags at the Centre for Mathematical Sciences.

Fire Alarms

If fire alarms go off in the Centre for Mathematical Sciences, the assembly point is on the lawn outside of reception.

First Aid

Please go to the Centre for Mathematical Sciences reception (located in the Core area next to the entrance) if you have a first aid emergency.

COVID-19

While no precautions are mandatory, we ask that all attendees respect the caution that others may be exercising.

Water

There is a water cooler for refilling water in the common room for Pavilion D, accessible through the Central Core.

Timing

Timing is key for the bus to the formal dinner – please don't be late!

Dress Code

There is no dress code for the week, with the exception of the Madingley Hall dinner on Thursday evening, where the recommended dress code is smart casual.

Contributors

Isaac Akanho

Research Software Engineer, ICCS

Isaac studied Computer Science with a specialisation in Artificial Intelligence at university. After graduating, he supported researchers with running their code and software on HPC clusters. He has worked on projects applying machine learning to classification and control tasks using python. He also enjoys delving into the system design of software and applications.

Matthew Archer

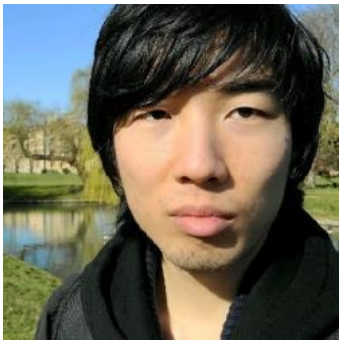
Senior Research Software Engineer, ICCS

Matthew Archer is a Senior Research Software Engineer at ICCS. He works on aspects of high performance computing, machine learning and system administration. Matthew has a PhD in Computational Physics from the same university specialising in Computational Solid Mechanics. He has lectured on Deep Generative Models in Tensorflow as part of the Master's in High Performance Computing at SISSA and is a Certified OneAPI SYCL and OpenMP instructor, delivering training material at Universities around the UK.

Jack Atkinson

Senior Research Software Engineer, ICCS

Jack is currently a Senior Research Software Engineer at the ICCS. He previously worked as a researcher in the fields of fluid mechanics, atmospheric modelling, volcanology, and space weather at the University of Cambridge and the British Antarctic Survey. His research interests lie mainly in geophysical fluid dynamics, numerical modelling, and computing, though he has also done data analysis and modelling for the sport of archery.



Tianzhang Cai

Research Software Engineer, ICCS

Tianzhang Cai is a Research Software Engineer at the ICCS. He completed his graduate degree in Machine Learning and developed experience in ML engineering and scientific computing after working as a ML Engineer Intern at an AI startup and a Research Engineer in a research project applying ML to improve energy efficiency of mobile networks. He is enthusiastic about leveraging his skills in machine learning and software engineering to advance climate science.

Laura Cimoli

Research Fellow, ICCS

Laura is an ICCS Research Fellow in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge. She is a physical oceanographer interested in ocean dynamics and their role in the climate system. Her research focuses on deep and abyssal ocean circulation and how it contributes to the sequestration and redistribution of tracers, such as anthropogenic heat and carbon. She mostly employs global hydrographic data and inverse methods to investigate the (poorly observed and modelled) deep ocean and its decadal variability.

Anna Denvil-Sommer

Research Scientist, NCAS, University of Reading

Anna is a research scientist at the National Centre for Atmospheric Science at the University of Reading (UK) where she works on a spin-up strategy for the global ocean model NEMO, for coupled modelling at high resolution. Previously, Anna has worked on the improvement of the global biogeochemical model PlankTOM using machine learning and observations at the University of East Anglia (UK), applying machine learning to reconstruct the ocean pCO2 (H2020, AtlantOS project; LSCE, France) and on the improvement of the ocean model meso-scale parameterisation using the global ocean model NEMO (Project Hermès founded under the Make Our Planet Great Again grant; CEA, France). Anna obtained her PhD in Physical Oceanography at LOCEAN (France) in 2016.

Chris Edsall

Co-director (Research Software Engineering), ICCS

Chris is a co-director of the Institute of Computing for Climate Science with a focus on software engineering. Within Cambridge University he is the Head of Research Software Engineering in Research Computing Services, acting Principal Software Engineer in the Cambridge Open Zettascale Lab and is a bye- fellow of Queens' College.

James Emberton

Research Software Engineer, ICCS

James is a Research Software Engineer with a background in Aerothermal Engineering. He has worked in gas turbine aerothermal analysis at Rolls-Royce, space thermal engineering at RAL Space and heat exchanger design software development for Reaction Engines.

Surbhi Goel

Research Software Engineer, ICCS

Surbhi's journey started at the University of Manchester, where she was awarded her degree in Renewable Energy and Clean Technology in 2017. Surbhi has always cared about protecting the environment, and this degree gave her a solid foundation. After graduating, Surbhi worked with several startups, where she created and maintained machine learning models for predicting electricity demand and solar power production.

She then went on to complete a Master's in AI for Sustainable Development at University College London (UCL) before joining ICCS as a Research Software Engineer in 2023.

Dr Tom Meltzer

Senior Research Software Engineer, ICCS

Tom is a Research Software Engineer with a background in atomic and molecular physics. He has been developing scientific code for over 10 years and is particularly interested in high performance computing.

Dominic Orchard

Co-director (Computer science), ICCS

Dominic is a computer scientist with a broad background in both the theory and practice of programming. He co-directs the Institute of Computing for Climate Science at the University of Cambridge and also holds a Senior Lecturer position in the Programming Languages and Systems group at the School of Computing, University of Kent.

Roly Perera

Research Fellow, ICCS

Roly is an ICCS Research Fellow in the Department of Computer Science and Technology at the University of Cambridge. Roly's research interests are in new programming language foundations for transparent and explorable digital media. A scientific paper should allow a reviewer to drill into a bar chart to see the underlying distribution, tweak model parameters, or remove an outlier from the dataset to see how the results would be affected, all within the context of the paper. Roly's research focuses on tools and techniques that expose, to readers as well as authors, this fine-grained structure. This will make it possible to create digital media which reveal how parts of visualisations relate to data and code.

Amy Pike

Research Software Engineer, ICCS

Amy studied an MSci in Physical Natural Sciences with a focus on Earth Sciences at Cambridge University. She conducted her final year project at the British Antarctic Survey, which included practical and computational elements. Following university, Amy trained as a maths teacher, then made the switch to working in the software industry. She has four years' industry experience and joined ICCS from her previous role as a Senior Software Engineer working on the back end of the BBC Sounds App. She has worked in Java, Scala and Python, and has used cloud technologies and github extensively. She lives with her husband and two cats in Essex.

Achintya Rao

Web Developer (Science Communication), ICCS

Achintya is a science communicator and researcher in science communication, with experience working at CERN and The Alan Turing Institute. He currently works on the EU-funded COALESCE project at the University of the West of England Bristol and on Fluid at the University of Cambridge. As a science writer, his work has appeared in publications such as Physics World and Nature Physics Reviews. His professional interests lie at the intersection of open science, free software and public engagement.

Arjen Tamerus

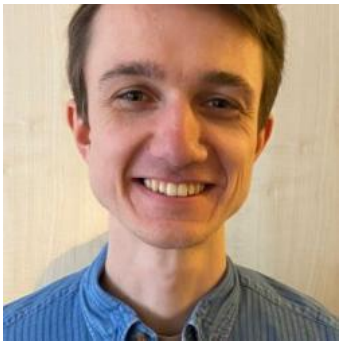
Senior Software Engineer, Cambridge Open Zettascale Lab

Arjen is a Senior Research Software Engineer with Research Computing Services at the University of Cambridge, and part of the Cambridge Open Zettascale Lab. His background is in computer science and high performance computing, and his main interest is in enabling and optimising massively-parallel scaling in scientific code. In daily life this translates to spending a lot of time porting, profiling and debugging codes on GPUs.

Pier Luigi Vidale

Professor of Climate System Science at the University of Reading

Pier Luigi is Professor of Climate System Science at the University of Reading's Meteorology Department and Senior Scientist at the Climate Directorate of the National Centre for Atmospheric Science (NCAS-Climate). Pier Luigi a specialist in global weather and climate modelling, including model development, with a special focus on i) tropical cyclones in the climate system and ii) land-atmosphere interactions at the local to regional scale. His research has led to breakthroughs in several areas, in particular: understanding the nature and causes of summer heat waves; understanding the feedbacks between atmosphere, vegetation (photosynthesis) and soil moisture; monitoring of vegetation growth and its variability from space; modelling of extreme weather and climate events, as well as quantifying their impacts (tropical cyclones, floods, droughts, wind storms).



Joe Wallwork

Research Software Engineer, ICCS

Joe is a Research Software Engineer with a background in numerical and computational methods for geoscientific modelling. Before joining ICCS in 2024, Joe did a PhD and postdoc at Imperial College London and worked as a Scientific Software Engineer at the Met Office. His PhD and postdoc research focussed on mesh adaptation and adjoint methods for finite element coastal ocean modelling.

Dr. Marion Weinzierl

Senior Research Software Engineer, ICCS

Marion has a degree in Media Informatics and a PhD in Scientific Computing. Before (officially) becoming a Research Software Engineer (RSE), she did a postdoc in Solar Physics and Space Weather Prediction, and worked as Computational Scientist at an x-ray technology start-up. Her first RSE position was in Advanced Research Computing at Durham University, where she also took on the role as Research Software Engineering Theme Lead at the N8 Centre of Excellence for Computationally Intensive Research. She joined the RSE team at ICCS in 2023.