Intelligent Earth

UKRI AI Centre for Doctoral Training in AI for the Environment

Open Day

Department of Physics

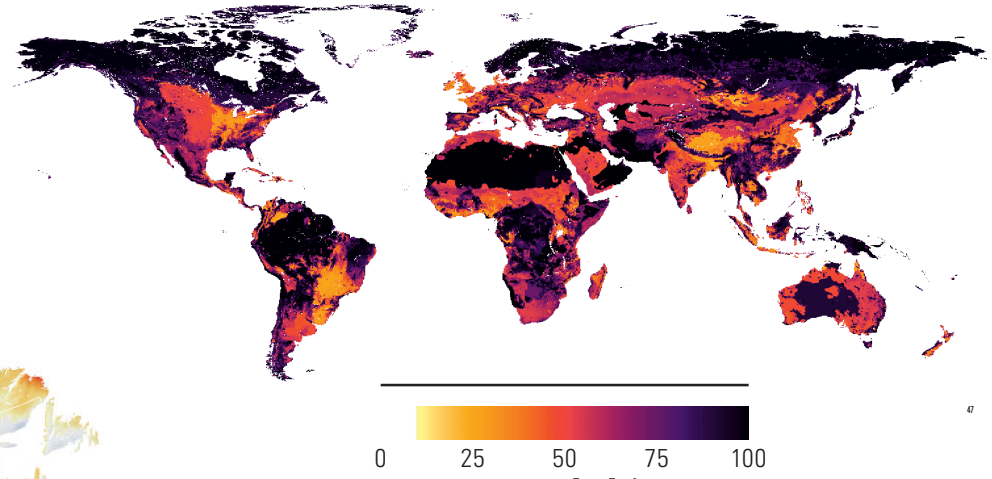
30/11/2023

Philip Stier (Physics), Hannah Christensen (Physics), Laura Stevens (Earth Sciences), Louise Slater (Geography), Adrian Thomas (Biology), Yee Whye Teh (Statistics), Stephen Roberts (Engineering), Andrew Markham (Computer Science)

Sophie Nixey (Intelligent Earth)

Earth is facing existential environmental challenges

Biodiversity loss

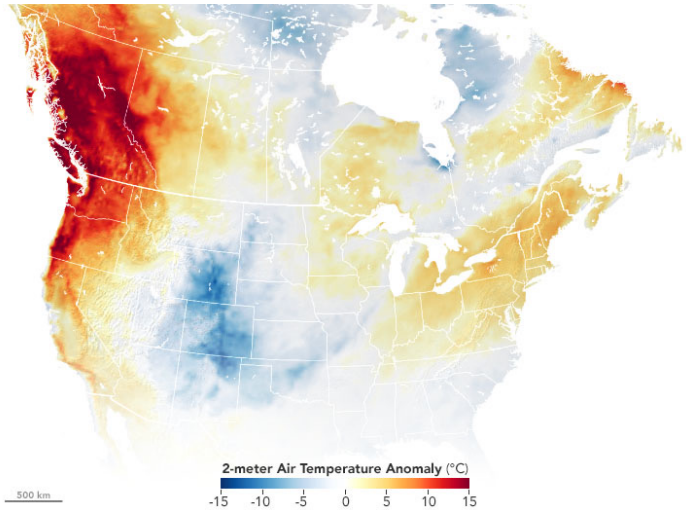


Biodiversity intactness index [%] (Natural History Museum, 2022)

Natural hazards

Floods in Germany causing 200 deaths in July 2021 (Science)

Climate change



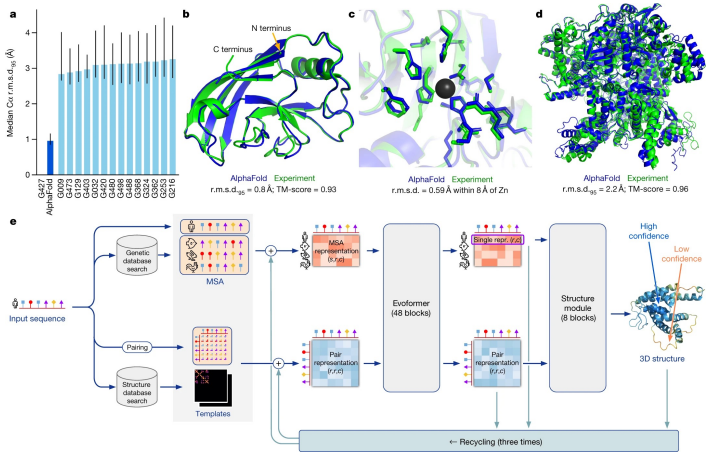
NASA Earth Observatory temperature anomalies on 27/06/2021

Air pollution

Air pollution kills an estimated seven million people worldwide every year (WHO)

AI/ML are transforming sciences

AlphaFold

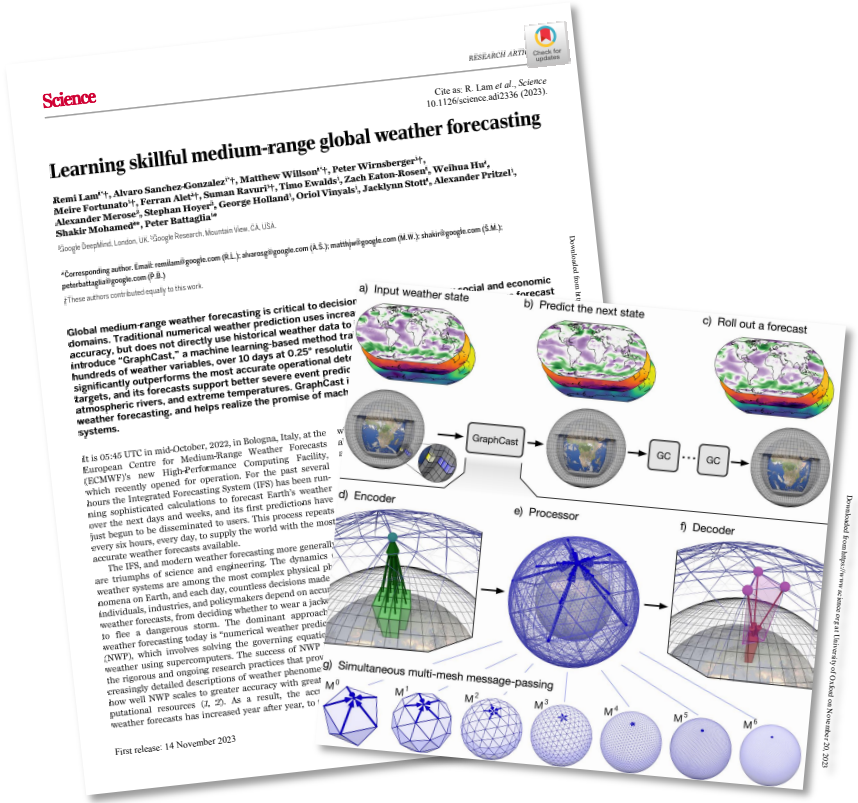


Jumper et al., Nature, (2021)

Exoplanet Detection

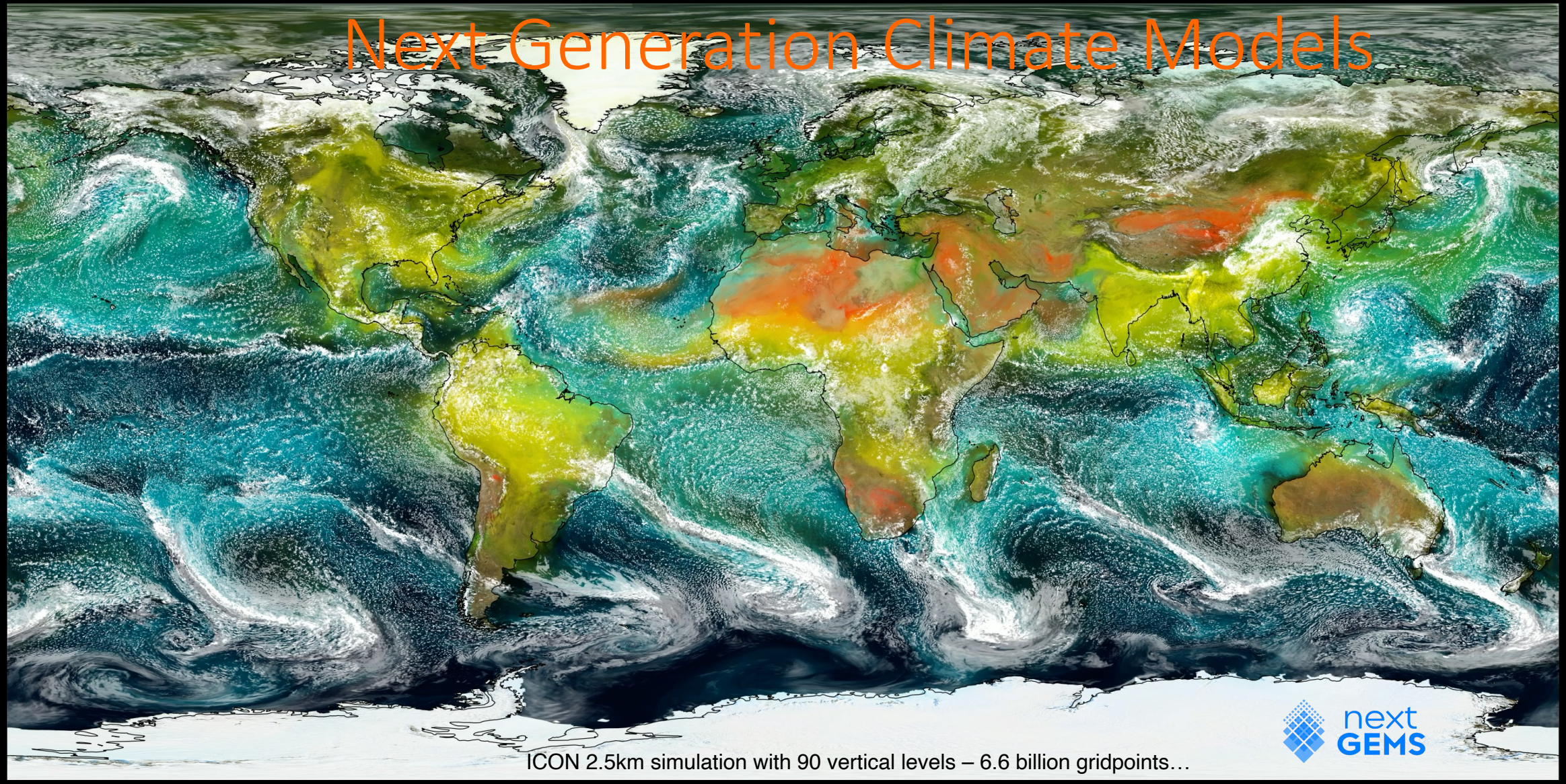
Zhang et al., Nat. Astron., (2022)

Weather prediction



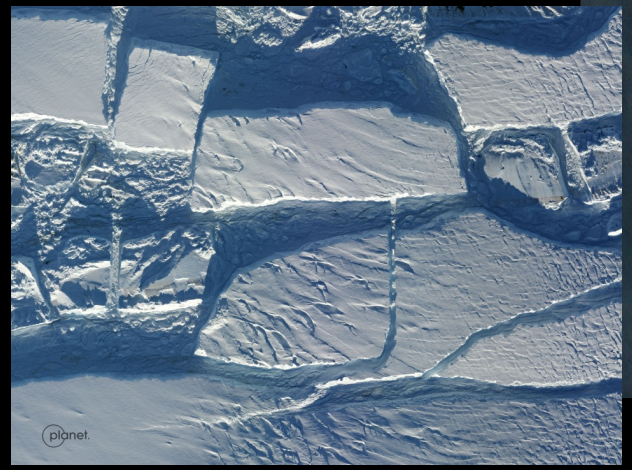
Lam et al., Science, (2023)

Next Generation Climate Models



ICON 2.5km simulation with 90 vertical levels – 6.6 billion gridpoints…

Next Generation Earth Observations



Planet CubeSat high resolution satellite data

Why Intelligent Earth?

- Numerous existential environmental crises
- Key science questions unresolved
- Vast and complex multimodal data
- Broad and deep domain expertise at Oxford and partners

We strive to train a new generation of PhD students equipped to tackle some of the most pressing environmental issues using AI…

… while advancing AI itself…

… in a positive and inclusive environment

Vision and Focus

Interdisciplinary PhD training programme with **two entry streams**:

- numerate environmental science backgrounds
- AI/ML, maths, statistics, physics,… backgrounds

Five closely connected themes:

1) Climate
2) Biodiversity
3) Natural hazards
4) Environmental solutions
5) Core AI/ML research on complex environmental science and data

Partners

Intelligent Earth departments:

- Department of Physics
- Department of Biology
- Department of Computer Science
- Department of Earth Sciences
- Department of Engineering Science
- Department of Statistics
- School of Geography and the Environment

Non-academic partners

...

Supervision

Intrinsically interdisciplinary for each PhD project:

- Joint supervision between environmental and AI academics from the Oxford CDT departments
- Additional non-academic advisor from partners, who also serves as host for a non-academic secondment
- Matching of students and supervisors will take place in the first two terms of the training programme.
- Primary department and supervisor will be assigned based on the focus of the project and the background of the student.

Projects

Intelligent Earth is a student-led programme:

- We do not advertise set projects. Students will be matched with supervisors based on interests and jointly develop their project.
- Exception: specific partner-led projects

We are planning for an annual intake of around 20 PhD students

Studentships are fully funded, including stipend, fees and a research and travel allowance

Training

- **Core courses** in foundations of AI/ML for environmental students and core courses in environmental science areas for data science students
- **Core skills training** for the full cohort, e.g. programming, version control,…
- **Advanced cross-cohort courses** focus on specific areas of AI, applied to grand challenges and datasets in environmental sciences
- **Professional skills training** with the Oxford Doctoral Training Centre
- **Research training**: three-month research project
- **Annual cross-cohort hackathons** co-organised with FDL and CDT partners and a **co-located cross-cohort CDT conference**
- **Weekly Intelligent Earth Seminars** (for the whole community)

The training will be individually tailored for each PhD student

What we are looking for

- We strive for inclusivity and diversity and seek to recruit candidates from a wide range of backgrounds – from the UK and worldwide.
- Applicants with a strong interest and motivation in the development and application of AI for environmental science and solutions.
- Intelligent Earth aims to develop and apply AI, hence candidates should have strong quantitative skills.

  Two entry streams: for numerate environmental science backgrounds and for AI/ML, maths, statistics, physics backgrounds.
- A broad interest in some or all of the five Intelligent Earth themes.

Thank you for your attention!

Intelligent Earth CDT leadership team

Philip Stier (he/him)

Professor of Atmospheric Physics & Intelligent Earth Director

Department of Physics

Hannah Christensen (she/her)

Associate Professor in Physical Climate & Intelligent Earth EDI Lead

Department of Physics

Stephen Roberts (he/him)

Professor of Machine Learning

Department of Engineering Science

Adrian Thomas (he/him)

Professor of Biomechanics

Department of Biology

Andrew Markham (he/him)

Professor of Computer Science

Department of Computer Science

Laura Stevens (they/them or she/her)

Associate Professor of Climate and Earth Surface Processes

Department of Earth Sciences

Louise Slater (she/her)

Professor of Hydroclimatology

School of Geography and the Environment

Yee Whye Teh (he/him)

Professor of Statistical Machine Learning

Department of Statistics

Questions

- To be answered in the Q&A session