

METEOROLOGY AT READING



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Joint Head of Department (Academic Staff and Teaching)

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About Uni

Our history:

- 1860 & 1870 - Schools of Art & Science established in Reading
- 1892 - “University College, Reading” an extension of the University of Oxford
- 1908 - Edith Morely becomes the first female Professor in Great Britain
- 1926 - Independent charter (power to award degrees as “The University of Reading”)
- 2008 – Linked with Henley Business School
- 2015 – NUIST Reading Academy founded
- 2016 – University of Reading Malaysia launched

The present day:

- 3 UK campuses (more in a moment)
- 23,000 students; 4,000 academic + support staff
- 150+ postgraduate courses (plus a wide range of undergraduate)
- Global top 200 (Times Higher Education World University Ranking, 2023)
- Queen’s Anniversary Prize for Higher Education (1998, 2006, 2009, 2012, 2022)
- Nobel Peace Prize (2007, with Al Gore and IPCC)
- 86% of all research output judged to be “internationally excellent” or “world-leading” (REF 2021)



First VC: Dr W.M. Childs in 1926



Edith Morely

Our main campus

- Whiteknights
 - Set in 130 acres of parkland
 - 10 Green flag awards (one of UK's top green spaces)
 - Mix of the old and the new
 - Union, Library, study areas, 2 museums, shops/cafes/bars
 - Thursday global food market
 - Several halls-of-residence on site
 - Historic Wantage to newly modernized facilities
 - Catered/self-catering
 - Families/couples/mature students
- Reading (the town)
 - Approx. 20-30 minutes from town centre on foot
 - Regular bus service from centre of campus
 - Modern and attractive town with long history (~8th century)
 - City of Sanctuary (including 12/yr Sanctuary Scholarships)
 - Reading Festival (87,000 music fans annually!)
 - 30 mins to London / Oxford (frequent train services across UK)
 - 40 mins to Heathrow (direct bus link)



Other UK campuses

- Greenlands (Henley Business School)
- London Road (Reading)



The University's research

Four broad themes – open-ended and overlapping crossing traditional research boundaries
Under these themes sit our 35 research divisions



AGRICULTURE, FOOD AND HEALTH

We apply our expertise to address global issues including climate change, resource degradation, hunger, poverty, diet and disease prevention and treatment.



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PROSPERITY AND RESILIENCE

What are the institutions and practices that help people and society to prosper? How do they help us build resilience against economic, social, political or environmental shocks? These are the key questions addressed by our theme



ENVIRONMENT

Bringing together Reading's world-leading strengths in research relating to the environment, our work aims to better understand and address the challenges of environmental change.



Environment theme



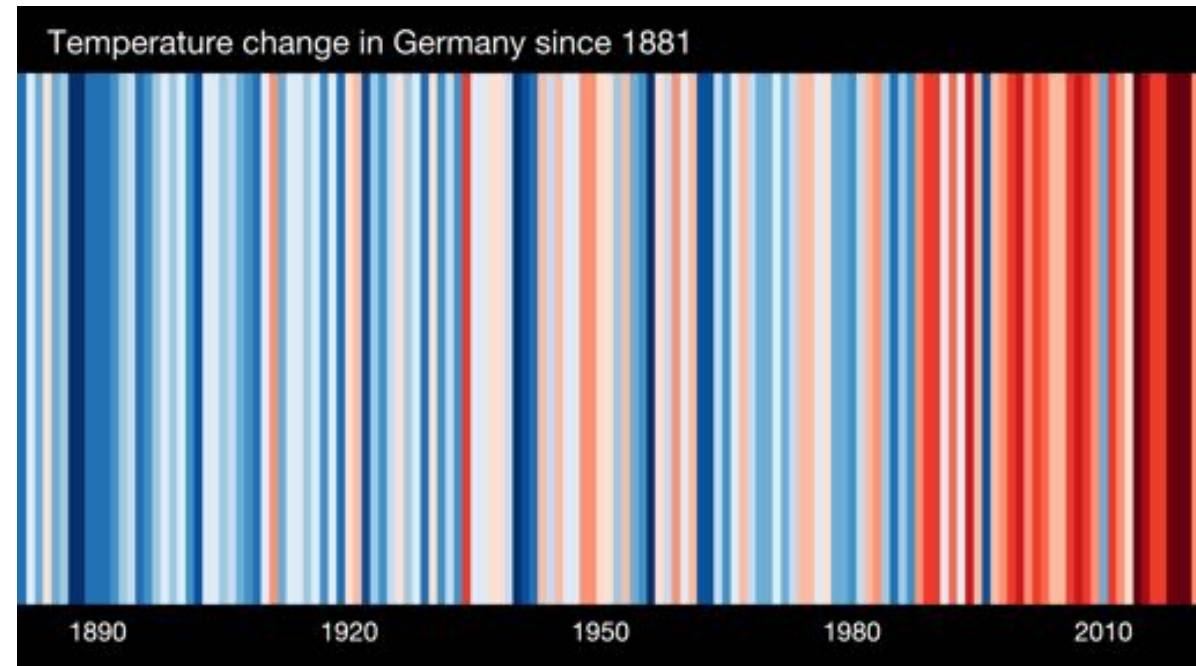
Research Divisions

- Weather ←
- Climate ←
- Ecology & Evolution
- Chemical Sciences
- Built Environment
- Environmental Science
- Maths & Statistics
- Earth Observation & Space ←
- Computer Science

About the Meteorology Department

- School of Physical, Mathematical and Computational Sciences
 - **Department of Meteorology**
 - Department of Mathematics and Statistics
 - Department of Computer Science
 - + Interdisciplinary Walker Institute for Climate Research
- Approx. 200 academics and research scientists, including
 - 5 Fellows of the Royal Society
 - Regius Professorship
 - 6 lead authors on most recent IPCC report
- Ranked 4th in world for Atmospheric Science research
- Approx. 150 students, roughly
 - ~40 undergraduates
 - ~40 masters
 - ~60 PhDs
- 100% graduates in work or further study in 15 months of graduation

<https://www.reading.ac.uk/meteorology/>



The home of #showyourstripes!

<https://www.reading.ac.uk/planet/climate-resources/climate-stripes>

Research Partnerships

A national hub for weather and climate research and expertise

- UoR hosts major components of the NERC funded **National Centre for Atmospheric Science** and **National Centre for Earth Observation**
- Long-term partnership with the UK **Met Office**, hosting Met Office staff and with a key role in the Met Office Academic Partnership (MOAP)
- Long-term collaborations with **European Centre for Medium-Range Weather Forecasts (ECMWF)**.
- ECMWF HQ moving to the University campus, associated with a University **£30m, 15-year investment** in a collaborative research programme.
- Aims to make UoR a **global magnet for research and applications at the frontiers of Earth System Prediction**



Working with business



- A regional community which brings together industry partners and researchers working in and with artificial intelligence



- Applies advanced data science and software engineering to help businesses understand and manage the risks and opportunities associated with a rapidly changing global environment



- A national centre established to accelerate the adoption and use of climate and environmental data and analytics by financial institutions internationally



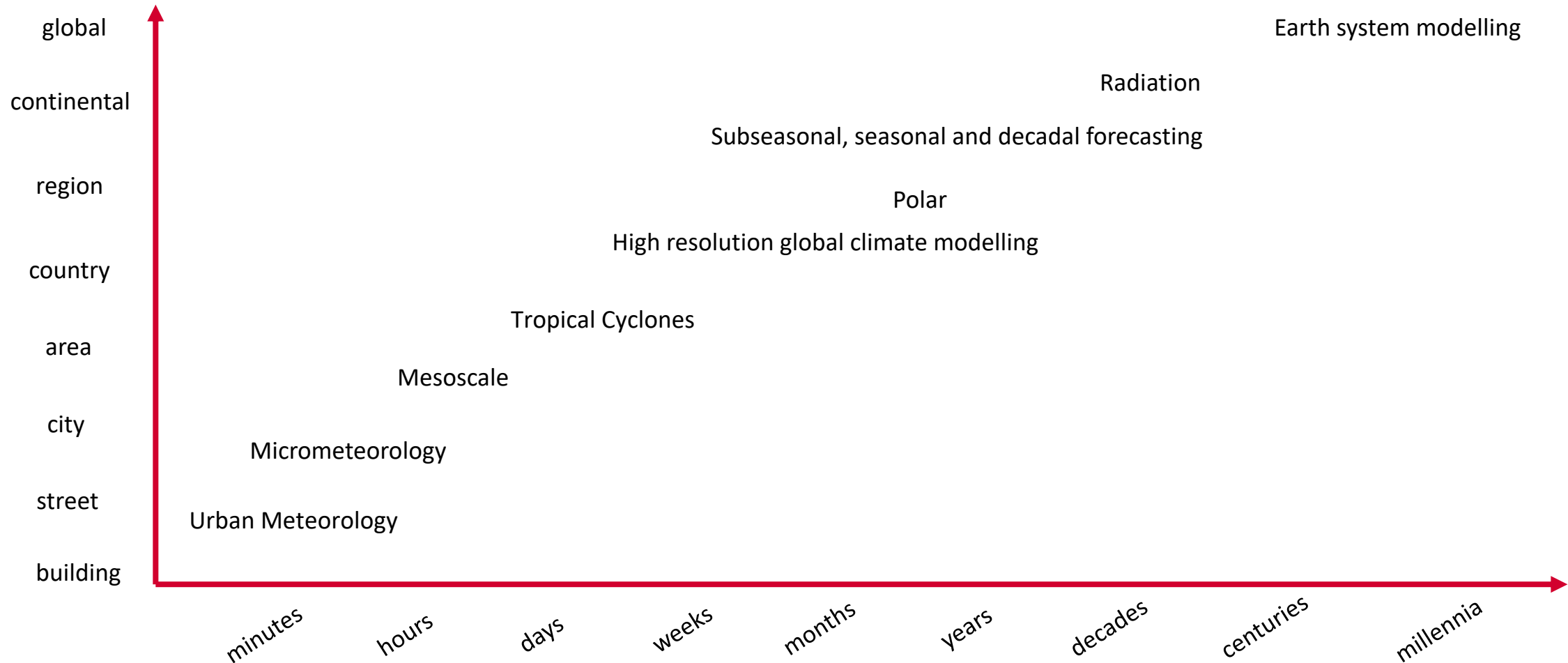
+ *many others*

Research groups

- Aerosols
- Aviation Meteorology
- Data Assimilation
- Dynamical Processes
- Energy Meteorology
- High resolution global climate modelling
- Institute for Environmental Analytics
- Land surface processes
- Mesoscale
- Met Office @ Reading
- Micrometeorology
- Ocean
- Polar
- Radiation
- Remote Sensing and Clouds
- Space and atmospheric electricity
- Tropical Applications of Meteorology (TAMSAT)
- Tropical
- Turbulence
- Urban Meteorology
- Water@Reading
- Tropical Cyclones

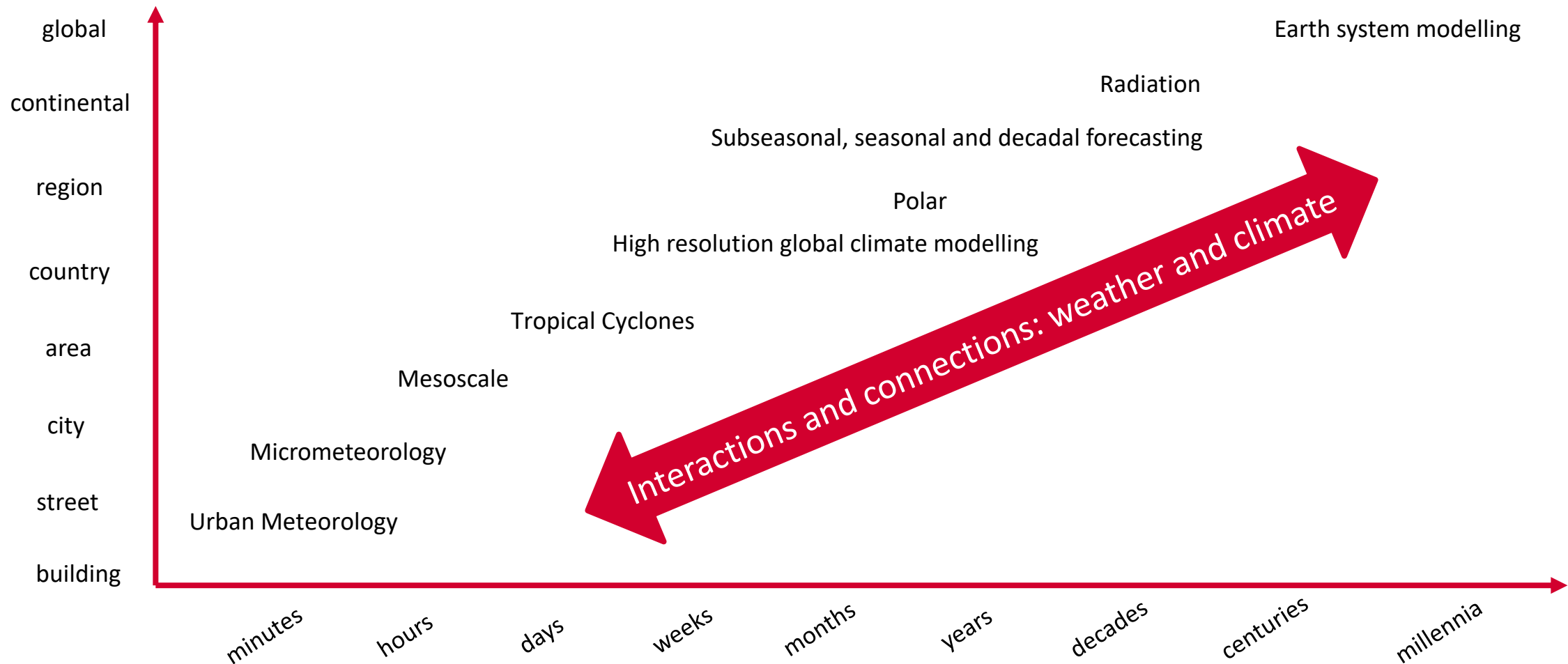
Our research

- Span wide range of scales in time and space



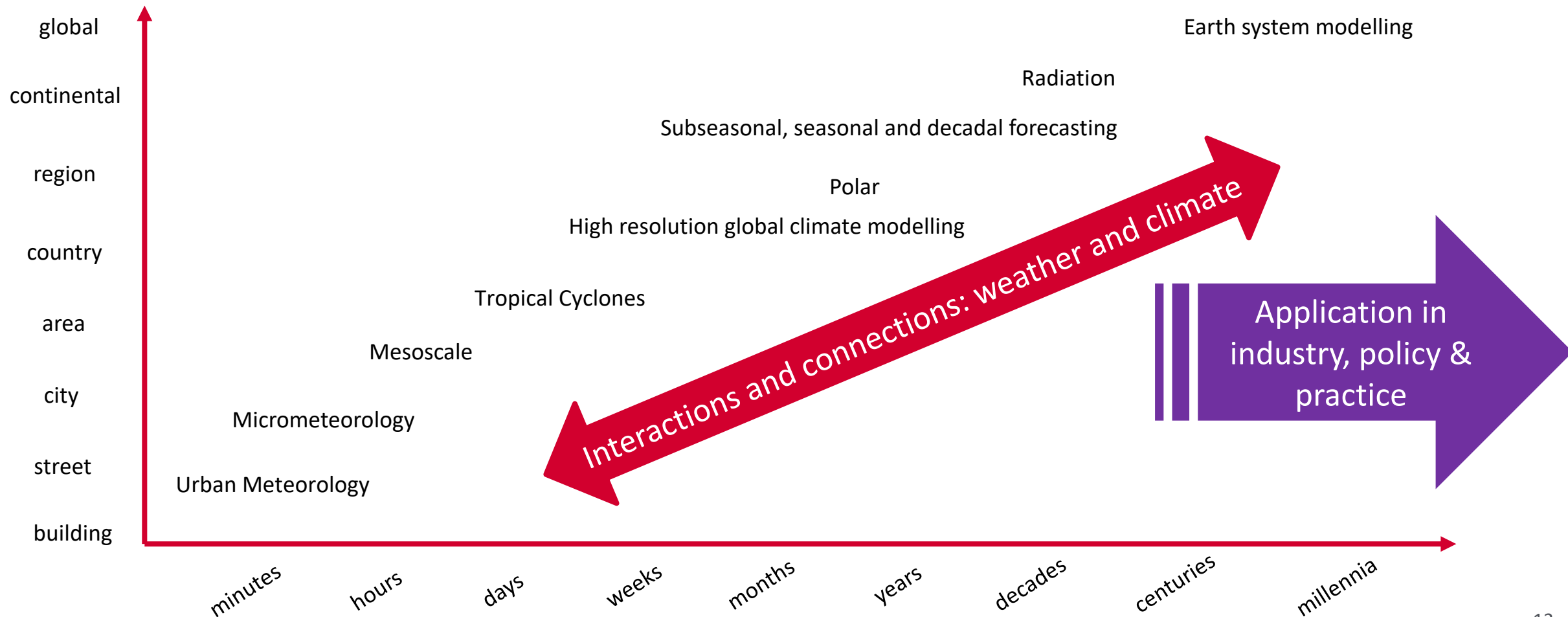
Our research

- Span wide range of scales in time and space: **interactions**



Our research

- Span wide range of scales in time and space: **interactions**
- **Increasingly:** reach into applications, policy and practice



Dynamical processes

- Much fundamental research on storm tracks, jets, blocking
- Illustrative examples from my own work

My PhD thesis (some time ago now!):

- Aquaplanet/idealized GCM experiments
- Storm track response to gross NH features

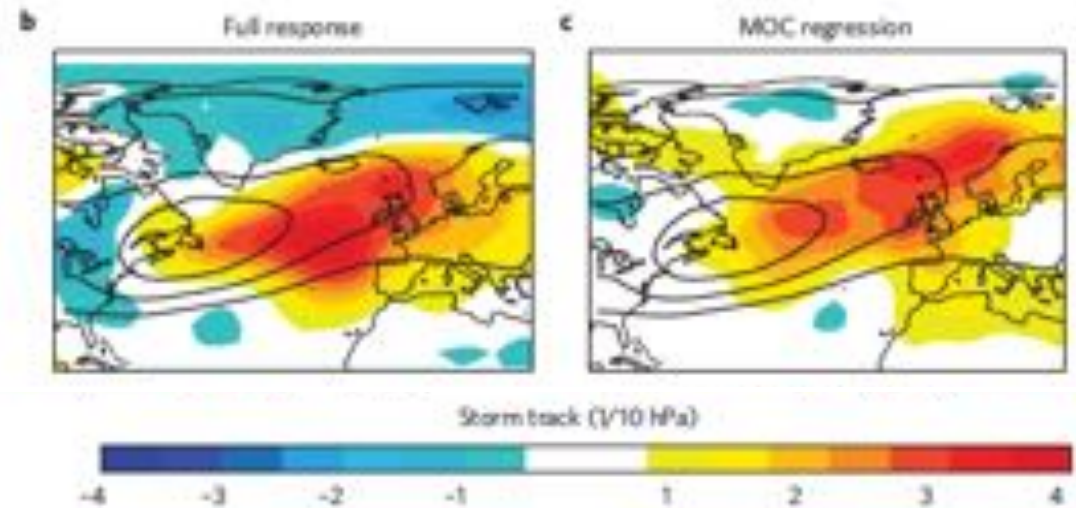
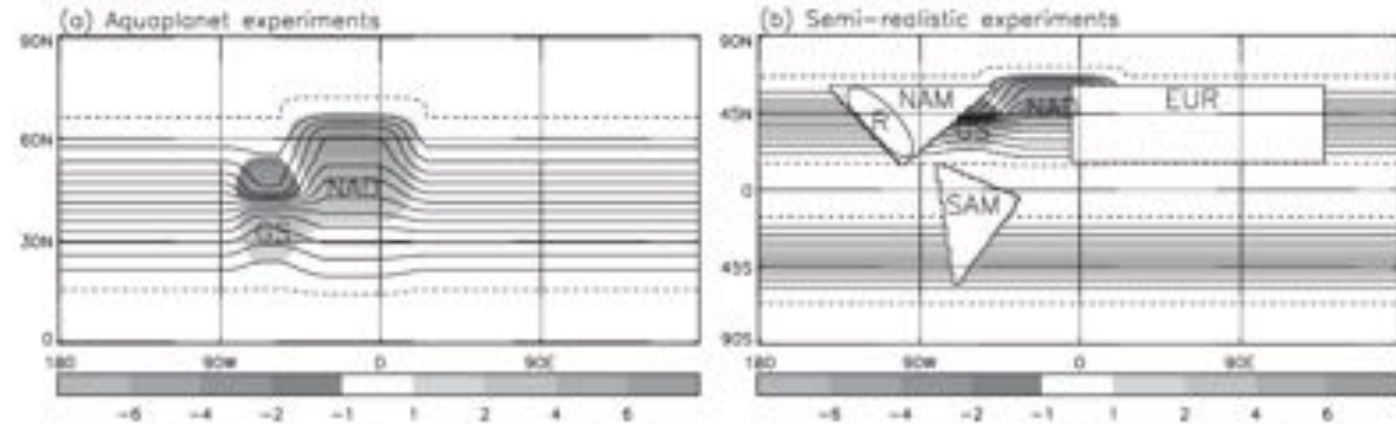
Subsequent analysis of CMIP3(!)

- Impact of AMOC weakening in state-of-the-art models (then!)

Fundamental understanding to improve confidence

More recent examples:

- Lagrangian tracers of moisture convergence zones
- Understanding weather regimes / teleconnections
- Climate change “storylines”



Figs: Brayshaw et al 2011, Woollings et al 2011

Energy Meteorology

- My own group (founded 2012)
- Wide range of issues:
 - Renewable resources
 - Power system design
 - Trading/forecasting

Recent example:

- Euro-CORDEX climate models
- Output "converted" to energy:
 - Wind → wind power
 - Temperature → demand for electricity
- Analysis in change in "demand-net-wind" for 2050

Other recent examples:

- Stress events (e.g., kalte dunkelflaute)
- Climate uncertainty in system design
- Machine learning for extended range forecasts (weeks-months)
- Decision-making under uncertainty (with BT)
- Forecast based finance (with Red Cross/Red Crescent)

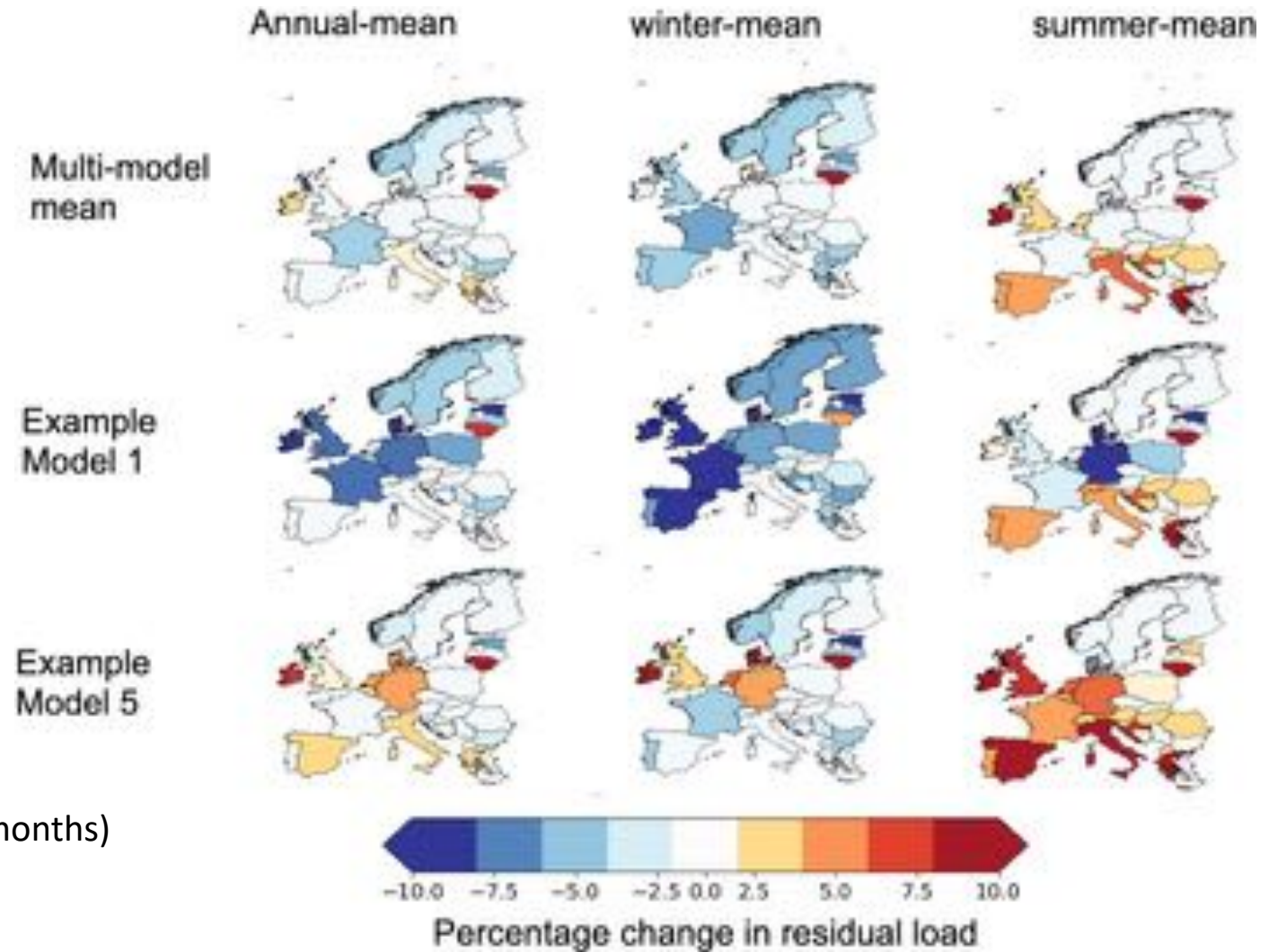


Fig: Bloomfield et al 2021

Taught courses - undergraduate

- BSc Meteorology and Climate (3yr)
- **MMet Meteorology and Climate with a Year in Oklahoma (4yr)**
- BSc Mathematics and Meteorology (3yr) with a Placement Year (4yr)
- MMath Mathematics and Meteorology (4y) with a Placement Year (5yr)

<https://www.reading.ac.uk/meteorology/undergraduate>

Year 1	Year 2	Year 3	Year 4
Calculus +	Differential Equations	Year in Oklahoma University	Boundary Layer Meteorology
Linear Algebra	Atmos & Ocean dynamics	School of Meteorology	Part 4 dissertation
Intro. Meteorology	Atmos Physics	Optional modules	General Studies
Weather & climate fundamentals	Numerical Methods for Env. Science	Visits to:	Remote Sensing
Skills for environmental science	Climate Change	<ul style="list-style-type: none"> • US National Weather Centre • National Severe Storms Lab 	Oceanography
Foundations of Mathematics	Surface Energy Exchange		Field course
Physics of the natural world	Statistics for weather and climate science		Climate Change
	Summer placement		Numerical Weather Prediction
	Forecasting practice and presentation		Tropical Weather Systems
	Atmospheric Chemistry & Transport		Extratropical Weather Systems
	... and others		Global Circulation

Taught courses - Masters

- MSc Applied Meteorology (1yr)
 - MSc Applied Meteorology and Climate with Management (1yr)
 - MSc Atmosphere, Ocean and Climate (1yr)
 - MSc Climate Change and Artificial Intelligence (1yr)
-
- *On-campus tuition, including access to instruments lab and atmospheric observatory*
 - *A limited number of scholarships are available*
 - *Small class sizes*
 - ***Dissertations:***
 - *Real research projects (many lead directly to research publications)*
 - *Work closely with one or more world-leading scientists*
 - *Wide range of topics: climate change, atmosphere/ocean dynamics, applications, urban ...*
 - *Many projects feature industry links*

<https://www.reading.ac.uk/meteorology/masters>

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Preparing for a career in meteorology-related science and research, with a focus on the use and interpretation of meteorological data and forecasts.

- *Accredited by the Royal Meteorological Society towards professional recognition (CMet and Rmet)*
- *Aligned with World Meteorological Organization Basic Instruction Package for Meteorologists (BIP-M)*

... with Management: includes one or more modules delivered by reknown Henley Business School

Sample core modules		Sample optional modules	
Atmospheric Physics	Hazardous weather analysis	Remote Sensing	
Forecasting systems and applications	Tropical Weather Systems	Climate Services and Climate Impact Modelling	
Measurements and Instrumentation	Atmospheric Chemistry and Transport	Climate Change	

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Preparing for a career in meteorology-related science and research, with a focus on:

- *quantitative description of the physical processes that produce weather*
- *physical and dynamical building blocks of our climate*
- *numerical & computational methods used to construct state-of-the-art models of the climate system.*

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Sample core modules	Sample optional modules	
Atmospheric Physics	Climate Change	Remote Sensing
Fluid Dynamics of the Atmosphere and Ocean	Tropical Weather Systems	Climate Services and Climate Impact Modelling
Numerical Modelling of the Atmosphere and Oceans	Global Circulation	Oceanography

Taught courses - Masters

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-
- *Our newest course: designed to address the growing demand for individuals with understanding of both our changing climate and artificial intelligence*
 - *Joint strengths of:*
 - *Department of Meteorology*
 - *Henley Business School*
 - *Walker Institute*
 - *Department of Computer Science*

Core modules

The Science of Climate Change

Applied Data Science with Python


Managing People and Organisations

Artificial Intelligence and Machine Learning

Climate Change: Values, Ethics and Justice

Taught courses – online, remote, CPD

- Online classes targeting CPD and professional training (Tropical Meteorology; Climate Services; Fundamentals of Met; Statistics)
- Open online courses
- Short courses and summer schools
- Meteorological Masterclasses (with the Royal Meteorological Society)



Climate Intelligence: Using Climate Data to Improve Business Decision-Making

Build climate resilience in your business as you learn how climate intelligence helps make decisions that mitigate risks.

Climate Services and Climate Impact Modelling

Delivered by [Prof David Brayshaw](#) and [Professor John Methven](#).

Runs from January to February 2023.

In this course, you will learn the science and practical techniques required for the provision of quantitative climate services and climate impact modelling. By the end, you will be aware of the strengths, limitations and sources of uncertainty in climate data and understand how it is produced (observations, reanalyses, forecasts and projections). You will also be able to handle quantitative weather and climate data, including complex geographical and forecast information, and to perform simple processing and analysis tasks in Python.



RMetS
Royal Meteorological Society

In partnership with
 University of Reading



9th Nov – register now!

RMets ·

MASTERCLASS | European Climate Variability and Uncertainty in Climate Model Projections

RMets:

- UK's learned body for weather & climate
- Based in Reading
- Supports advancing the science
- 8 journals, 50 events/year, professional accreditation

<https://www.reading.ac.uk/meteorology/online-courses>

<https://www.rmets.org/event/masterclass-european-climate-variability-and-uncertainty-climate-model-projections>

Research – PhD and Fellowships

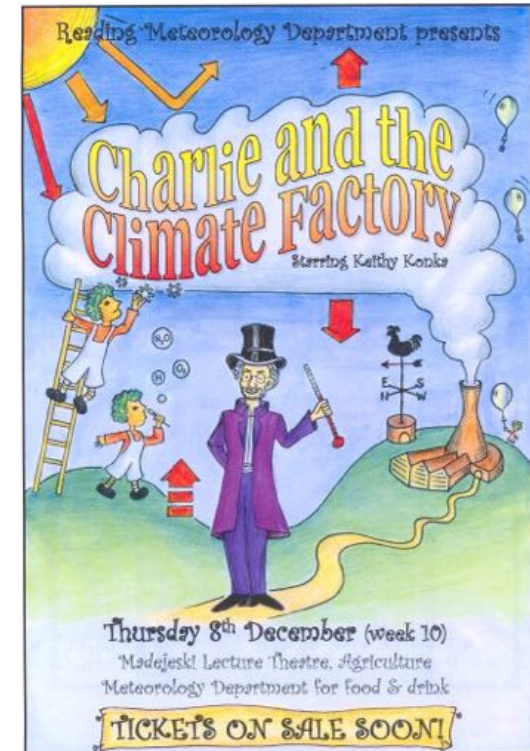
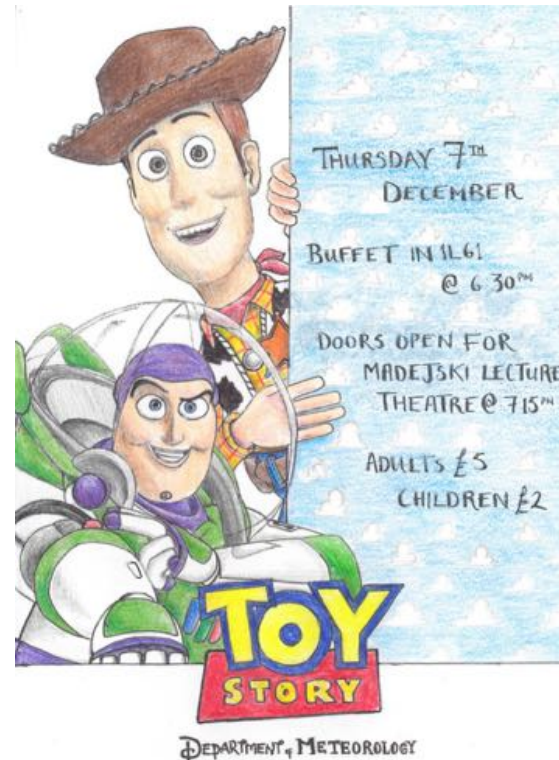
- Doctoral Training Programme
 - Bursaries, studentships & funding
 - Researcher development programme
 - Leadership development programme (with HBS)
 - Preparing to teach



- Hosting research fellowships
 - Always very pleased to discuss with potential applicants to fellowship schemes
 - Not sure of specifics for Germany, but e.g., UKRI, Newton, Fullbright (US), CSC (China) ... Humboldt?
 - Competitive start-up package for successful applicants
- Regularly advertise for postdoctoral researchers (contract postdocs)

Social

- BBQ
- Panto
- “Black tie” formal
- Carols
- Sports
- “Sappo club”
- Charity/fundraising events



Summary

- Reading: a great place to work and study!
 - A world-leader across whole breadth of weather and climate research, and it's applications/impacts
 - Strong interdisciplinary connections across the university
 - “Friendly” and open community
- Lots of information on our website: <https://www.reading.ac.uk/meteorology/>
- Contact: d.j.brayshaw@reading.ac.uk

