REACH FOR THE SKIES
NCAS TRAINING PROGRAMME
NCAS. WORLD LEADERS IN ATMOSPHERIC SCIENCE.

From measuring individual raindrops and quantifying chemical reactions in labs, to satellite remote sensing of air pollution dispersion and modelling global temperature change; the scale of atmospheric science is immense.

The National Centre for Atmospheric Science (NCAS) is a world-leading research centre dedicated to the advancement of atmospheric science, and is committed to providing the best training in atmospheric science in the UK.

We believe that developing the next generation of atmospheric scientists is the best way to ensure that excellent atmospheric science can happen in the future.

Build your place within the atmospheric science community by developing skills and knowledge with NCAS. We can help you to reach your goal.

“The range of lecturers and exercises have been very useful and group work activities have reinforced some of the new information I have learnt.”

NCAS Student
RESEARCH-LED

DELIVERED BY EXPERTS

FULL SPHERE OF ATMOSPHERIC SCIENCE

MASTER THE FUNDAMENTALS

REFINE YOUR TECHNIQUES

Weather  Atmospheric composition  Climate science  Data management  Hands-on measurements  Data analysis  Programming  Modelling
THE FUNDAMENTALS

INTRODUCTION TO ATMOSPHERIC SCIENCE

DATE: WINTER
LOCATION: LEEDS
MAX CAPACITY: 40
DURATION: 5 DAYS

Leading atmospheric scientists introduce you to the key concepts of atmospheric science.

Broaden your understanding of atmospheric processes and interactions, develop an awareness of how your work fits within the big picture, and discover the unexpected connections between different research projects.

Begin to build your knowledge and become part of the atmospheric science community. We will work with you to provide the foundations for your work in atmospheric science and develop a route forward for more detailed study.

INTRODUCTION TO SCIENTIFIC COMPUTING

DATE: AUTUMN
LOCATION: LEEDS
MAX CAPACITY: 30
DURATION: 5 DAYS

Skilled computer scientists will introduce you to the fundamentals of scientific computing.

You will be tutored by experts from the Centre for Environmental Data Analysis who solve scientific data challenges on a daily basis.

We will provide you with the essential knowledge and skills to start using computers for cutting-edge environmental science research, and provide you with the necessary experience needed to attend the NCAS data analysis tools day and other technical courses.
NCAS scientists work worldwide to help solve global challenges. Our experienced and highly-skilled research teams are involved in measurement campaigns across the globe: from long term measurements in Cape Verde and Iceland, to field campaigns in Beijing and Cornwall. Researchers at NCAS have experience overcoming all the challenges you might expect to find in large-scale projects, including airborne instrument deployment.

Excellent practical skills are essential for those involved in fieldwork or laboratory-based science and these courses will provide a strong background in the skills needed to design and carry out experiments, and collect high quality data.

Phil Rosenberg, NCAS Instrument Scientist, explains “all our understanding of meteorology, weather and climate change is based on measurements. Fundamentally, the measurements inform the models and the models produce hypotheses that we test against using measurements. We’ve got to understand the measurements in order to draw good conclusions from our data and our models. Measurements have all got their own flaws, their own individual problems. Different people make measurements in different ways, and people need to work together to get a good data set. All big field campaigns nowadays involve multiple groups, collaborating, organising themselves to make measurements in the same way, or different ways to compare measurements. Without that, we really can’t test the big questions in atmospheric science.”

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## Making Measurements

### Atmospheric Measurement Summer School

**Date:** Spring  
**Location:** Isle of Arran  
**Max Capacity:** 24  
**Duration:** 12 days

Experienced researchers will help you to develop the core skills required to excel in practical fieldwork.

With guidance from eminent scientists and dedicated group mentors, you will work in small teams to prepare and deliver daily weather forecasts, profile the atmosphere, operate instruments in remote locations, and investigate atmospheric trace gases and aerosols.

### Practical Aerosol Science

**Date:** Summer  
**Location:** Manchester  
**Max Capacity:** 25  
**Duration:** 2.5 days

NCAS scientists and leading industry professionals from TSI UK will introduce you to the techniques used and challenges faced when making aerosol measurements.

We will provide you with a theoretical understanding of aerosol properties and instrument applications, followed by hands-on experience in aerosol measurements using cutting-edge equipment in our labs.
Dr Ailsa Stroud is a climate scientist who has travelled to the ends of the earth in pursuit of atmospheric science. During her PhD at the University of Cambridge, Ailsa attended the NCAS Atmospheric Measurement Summer School to help prepare for fieldwork campaigns. Ailsa has since worked for the British Antarctic Survey for five years and now advises the UK government on air quality policy.

Ailsa’s interest in climate science stemmed from a fourth year project in her Chemistry undergraduate degree but became more motivated to pursue this career following the death of her father, Ailsa says this gave her the impetus to do something meaningful with her life. Like many atmospheric scientists, Ailsa has a diverse skill-set which ranges from chemistry to geoengineering, and fieldwork has been an important part of her career.

1. What have been the highlights of your career so far?

I remember flying out of my field season in Antarctica on a beautiful sunny morning, having completed our mission of three new ice cores. As we flew to the main base, Rothera, through some jaw-droppingly beautiful scenery of icebergs, crevasses and seal colonies I remember noting it was a Monday morning and thinking I was the luckiest commuter in the world. I still think I was probably right. In terms of influence on the state of the environment though, I think it’s being part of the UK delegation for the IPCC (Intergovernmental Panel on Climate Change).

2. Antarctica and the Arctic seem unlike anywhere else on earth, how did you adapt to working in such a remote location?

A lot of the preparation comes from knowing you’re not alone, despite being so remote. Support services in logistics, medicine, shelter, technical and even culinary advice was all very well-considered. In terms of being personally prepared, I got fit and was prepared to get stuck in with all tasks, be it shovelling snow or tying knots.

If you’re not a pro at the beginning you soon will be. Taking time to mentally look after yourself is just as important for maintaining sanity and work ethic. For me, this meant going for a walk alone every couple of days to do a video diary and somehow articulate the ups and downs.

3. Shortly after you started your PhD in atmospheric science, you signed up for the NCAS Atmospheric Measurement Summer School based on the Isle of Arran. What did you hope to get out of the course?

I was about to embark on my first bit of international fieldwork as the sole representative of my University and felt the pressure to not let my lab team down. I also felt pretty out-of-depth in terms of meteorology and interpreting chemical data alongside the vast array of variables when doing in-situ experiments. I didn’t even have a Physics A-level, so going back to the classroom was great for tackling that hurdle.

4. Is there anything in particular from your time on the Isle of Arran that has helped you throughout your career?

To not be afraid to tackle a new environmental problem despite it not technically being “your field”. This is something I now do on a daily basis as a science policy adviser where I apply my scientific skills to a multitude of issues and interpret experts’ views into a tangible set of choices for policy-makers.

“Be willing to work out of your comfort zone but be imaginative about how you show this.”
5. After a few years working at the British Antarctic Survey, you decided to return to the NCAS Atmospheric Measurement Summer School – this time as a mentor. How do you think your fieldwork experience helped to enrich the course?

I hope by showing the multidisciplinary aspect to being a field experimentalist. I used real problems I had experienced to challenge the students: “What will you do when your calibration diffusion tube breaks in transit?” or “How many reefers are you going to need to store your ice core and how will you ensure they are reliably powered?”

6. What advice would you give to young scientists hoping to work in atmospheric Science?

Be willing to work out of your comfort zone but be imaginative about how you show this. I interviewed someone at BAS because despite having no experience of working in cold temperatures, she was a hobbyist caver! Also, personalities and civil duties matter when you’re on fieldwork (so it’s never OK to skip your washing-up duty).

The luckiest commuter in the world

2007 Attended the NCAS Atmospheric Measurement Summer School
2010 Achieved PhD on composition of urban and marine atmospheres at University of Cambridge
2010 Ice Core Analytical Scientist at British Antarctic Survey
2011 6 weeks on a deep ice core drilling campaign in Greenland & mentored on the NCAS Atmospheric Measurement Summer School
2011 & 13 Mentored on the NCAS Atmospheric Measurement Summer School
2012 10 weeks in Antarctica leading a campaign to drill new ice cores
2015 Science Advisor in the Department for Energy and Climate Change
2016 Senior Air Quality Science Policy Advisor at Department for Environment, Food and Rural Affairs
Weather and climate models are fundamental tools that help scientists understand changes happening in our world now, and in future. They provide essential information to help us inform government, businesses and policy-makers about the state of our climate.

As technology advances, increasingly complex models are being developed and run on state-of-the-art supercomputers. NCAS provide research-led training in computer modelling for aspiring scientists who want to get up and running with some of the most widely used climate and weather models. Researchers who write, maintain and run models on a daily-basis will teach you how to get the best out of these models.

Our modelling expertise has brought NCAS into collaboration with a variety of international partners, including participating in the International Panel for Climate Change assessment reports and working alongside international meteorological organisations.

NCAS training courses take advantage of our global position to deliver cutting-edge tuition. For example, close ties with the United States National Centre for Atmospheric Research (NCAR) enable us to provide the only WRF Users Tutorial in Europe delivered by NCAR researchers, effectively leveraging resources from two powerhouses of atmospheric research to provide training for model users. Senior Scientist Joseph Klemp says “the ability of participants to informally discuss their own modelling research with the modelling experts from NCAR and NCAS is a particularly valuable aspect of the tutorial.”

Model applications can be broad ranging, and NCAS recently worked alongside Sir Ben Ainslie’s sailing team to provide modelling guidance and support during their bid to win the prestigious sailing trophy, the America’s Cup. Jessica Sweeney, Chief Meteorologist for Ben Ainslie Racing, said “the expertise of NCAS was key to our understanding of the weather in Bermuda. Together, we conducted experiments on optimising a high-resolution atmospheric model for this small and isolated subtropical island. The results gave us an excellent picture of the race course, helping us with critical decisions such as the daggerboard choice and our tactical strategy.”

“Close ties with the United States National Centre for Atmospheric Research (NCAR) enable us to provide the only WRF Users Tutorial in Europe delivered by NCAR researchers, effectively leveraging resources from two powerhouses of atmospheric research to provide training for model users.”
MODELLING

**CLIMATE MODELLING SUMMER SCHOOL**

**DATE:** AUTUMN  
**LOCATION:** CAMBRIDGE  
**MAX CAPACITY:** 35  
**DURATION:** 12 DAYS

NCAS climate modellers will provide tuition on the fundamental scientific principles of climate models. You will have the opportunity to implement and operate models on cutting-edge supercomputers, assess the quality of the model results and perform high-level analysis, giving you an understanding of the strengths and limitations of climate models.

**INTRODUCTION TO UNITED MODEL TRAINING**

**DATE:** AUTUMN & SPRING  
**LOCATION:** READING  
**MAX CAPACITY:** 30  
**DURATION:** 3 DAYS

Experts from the NCAS Computational Modelling Service will introduce users to the Unified Model, the computer model used for weather and climate prediction at the UK’s Met Office and other forecasting centres worldwide. Through hands-on workshops you will learn about the model infrastructure, setting up and running your own experiments, and troubleshooting common problems.

**WRF USERS TUTORIALS**

**DATE:** AUTUMN  
**LOCATION:** LEEDS  
**MAX CAPACITY:** 60  
**DURATION:** 5 DAYS

Leading scientists from the US National Center for Atmospheric Research will introduce you to the Weather Research and Forecasting (WRF) Model, a next-generation mesoscale numerical weather prediction system developed by them, designed for both atmospheric research and operational forecasting applications. You will develop core WRF set-up and model execution skills, work with experts to understand how develop the model for your own modelling applications, and become part of the global WRF community.

**INTRODUCTION TO UKCA**

**DATE:** WINTER  
**LOCATION:** CAMBRIDGE  
**MAX CAPACITY:** 22  
**DURATION:** 2.5 DAYS

Accomplished computer modellers at NCAS, with support from our research partners, will introduce you to UKCA and provide you with practical experience of setting up, modifying, and running experiments. UKCA is a community chemistry-aerosol-climate model based around the Met Office Unified Model and the atmospheric composition module of the joint NERC-Met Office Earth System Model (UKESM1).
REACH FOR THE SKIES
EXPLORE YOUR OPTIONS
AND APPLY ONLINE

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