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Circulation

The NCAS Newsletter

13

Welcome

As always there's a lot going on in NCAS, we have winners of prizes, trees being planted, red noses and new arrivals (both adult and baby!), not to mention science! We have an exciting year ahead with the NERC 50th Celebrations and a whole host of field campaigns, meetings and events.

Here in Leeds we're preparing for the largest NCAS science conference ever, with record numbers of delegates registering to attend. It looks like it will be a really interesting and inspiring event.

Happy Easter and thanks for reading. Felicity

NERC Impact Awards Winner

NCAS Chief Scientist, Professor John Pyle FRS was honoured in the inaugural NERC Impact Awards as

the Overall Winner. Professor Pyle and Dr Neil Harris were rewarded for a large body of work that has led to a greater understanding of the depletion of ozone in the stratosphere, and influenced the



Montreal Protocol.



Staff News

We welcome Ioana Colfescu. In February Ioana started as a Postdoctoral Research Associate at the School of Geosciences, University of Edinburgh, with Prof. Simon Tett and Prof. Gabriele Hegerl. Their research will seek to unravel the causes of variability in extreme temperatures over Europe in the modern climate record and thus, advance the understanding of potential impact of human drivers on extreme events.

We welcome Steven Sharpe to the Admin team in Leeds as the Events & Administration Officer. If you have any enquiries about an event you are hosting or would like to speak to him about an NCAS meeting, please contact him via steven.sharpe@ncas.ac.uk or call him on 0113 3436408.

New Arrivals

We congratulate Nick Klingaman (Reading) on the arrival of Noah William, on 1 February. He weighed 6 pounds and 14 oz (3.12kg). The Klingaman's are all doing well and are enjoying being a family!

We are also delighted to announce the safe arrival of Leo Jack Barraclough born 11th February, weighing 6lb 15oz. Nikki (Leeds) and baby are doing well.

Have your say

Got news? New NCAS staff member starting? Published a paper? Want to nominate a Scientist to be featured in a profile? Got an idea for a feature for the Newsletter? Having a meeting, seminar or talk? Please contact Felicity.



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NCAS Radar: high-impact air-traffic management

The NCAS mobile radar has been playing a central role in a high-impact air-traffic project. The Radar has been loaned back to the manufacturer, Selex ES GmbH, for a 3-month project at Braunschweig Airport. Weather conditions have a major impact on all aspects of aviation and therefore Selex are leading two projects focussed on the local weather situation at airports in conjunction with the The Single European Sky (SES) initiative.



SES was launched by the European Commission in 2004 to restructure European airspace, create additional capacity, improve safety, reduce the effects on the environment and increase efficiency of the air traffic management (ATM) system. The Radar is part of the SES Air Traffic Management Research (SESAR), the technological programme aiming to develop state of the art technology to achieve these goals (<http://www.sesarju.eu/discover-sesar>).

The Radar will provide dual-polarisation information to derive precipitation classifications, e.g. snow and freezing rain, and to locate thunderstorm activity.

One project is to test the performance of a Ground Weather Monitoring System (GWMS) prototype, which will provide a number of meteorological

products describing the current state of the atmosphere using measurements from radar, lidar and surface stations e.g. wind shear and turbulence, temperature profiles and surface temperature. These products will feed into their second project, another prototype tool called the Weather Information System for Airport Decision Support (WISADS) that will generate alerts and warnings and visualise them for the ATM user.

Selex's goal is to test the reliability of the products and the operational performance of the prototype from an engineering point of view. However NCAS staff (Alan Blyth, Ryan Neely and Lindsay Bennett) will be involved in analysis of the data, using the dual-polarisation information to examine the microphysical properties of clouds and precipitation. The data will be used in conjunction with WRF model simulations that Ralph Burton and James Groves are running in near real-time for the duration of the project. Neely and Lindsay will visit the site in March to talk to the project partners and look at the data collected.

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Controversy A Video Short

Paul Williams co-presents a short film by the Royal Society entitled 'Controversy', part of the commemoration of the 350th birthday of their Philosophical Transactions journal.

The video takes a look at the challenge for the future of how we can keep science as a public enterprise. Paul co-presents with Professor Geoffrey Boulton FRS, University of Edinburgh, and they discuss why accurate data are critical for the scientific record. Other titles in the series include Knowledge, Equilibrium and Identity.

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All films in the series can be viewed here: <https://royalsociety.org/publishing350/science-stories>





NERC 50th Anniversary Celebrations

This year NERC are celebrating their 50th anniversary, and we will be celebrating with them. There are a wide range of events and a couple of small funding initiatives that are happening throughout the year. I have included details of some of the events that are happening during 2015, and specifically ones that NCAS will be engaging with.

April - The Great NERC Bake Off

NERC Swindon office are hosting The Great NERC Bake Off on Thursday 30 April – a staff event with external exposure. It's an opportunity for staff to get involved with the anniversary; create environmental themed cakes, engage with other staff, raise awareness of NERC and money for charity.

If you would like to organise your own parallel bake-off please let me know and I can send you more details. NERC will provide small prizes for your bake off winners.

June - BGS Open Day

BGS are hosting a NERC 50th Anniversary themed public open day in Keyworth on the 27th June, from 10am – 4pm. All six NERC research centres are attending and we will be taking the aircraft mock-up, some hands on atmospheric science experiments and examples of our work to display and demonstrate to the public. Last time BGS ran an open day they had over 2000 visitors, and are expecting in excess of 3000 on the day this year so it is a great opportunity to engage the public with atmospheric science

Volunteers Required - To make this event successful I am looking for volunteers and ideas. If you'd like to help out or have ideas of things to display or do at the open day, please contact me as soon as possible

by email (felicity.perry@ncas.ac.uk). Travel and subsistence costs will be covered.

October – NERC 50th Anniversary - NOC Ship RSS Discovery and FAAM aircraft in London

NERC's 50th Celebrations peak in October for the arrival and mooring of the RSS Discovery (NOC ship pictured below) in London, between the 7th and 10th of October. There are a range of events occurring including stakeholder engagement events, public engagement and science events.

We plan to take the FAAM Aircraft to London for this event, and will combine stakeholder events, science and public engagement over the three days. The aircraft will be based at London City Airport, and we will also be flying science missions in and out of London City

Dr Ruth Purvis is putting together a science mission for the three days and we hope to be able to fly in and around London at a range of heights, combining one (or two) of these flights with stakeholder and public events on and around the Discovery - the FlyBy!

The third aspect of the event is the use of the Aircraft mock-up and flight simulator, plans are not finalised, but it is most likely that we will have a space on the RSS Discovery for this display - and visitors to the ship would be offered tours where we will be able to demonstrate and display our science and facilities.

As you might imagine, **volunteers are required** for this event, so if you can spare any time we would be extremely grateful. It is invaluable to have a good number of scientists in attendance to inspire and engage the public, stakeholders and VIP's with our science, services and facilities. Without your help, these events cannot be successful.

Please contact me as soon as possible by email (felicity.perry@ncas.ac.uk) to volunteer. Travel and subsistence costs will be covered.



Photo - The NOC Ship RSS Discovery

COSMICS Relief



The ARA and COSMICS team on detachment in Prestwick don red noses for Comic Relief. The Cold-air Outbreak and sub-Millimetre Ice Cloud Study (COSMICS) was flying in and around Prestwick and to the North of the UK.

COSMICS aimed to investigate the processes controlling the transition between stratiform and cellular cloud structure in cold-air outbreak flows, including: Surface fluxes of heat and moisture, Boundary-layer structure and flux profiles and Microphysical and precipitation processes, in particular ice formation and growth

Soapbox Science

Charlotte Pascoe (CEDA) will be taking part in a Soapbox Science event (<http://soapboxscience.org/>) on the 7th June 2015 in Bristol.

The idea is to communicate the science we do to people who wouldn't necessarily choose to go to science museums or science events. Think of it as busking but for science. Charlotte will be talking about climate models and how we can use them to ask questions about the future.

Save the Date

NCAS Science Conference 2015

16 - 17th July 2015. York.



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SEDSIC: India

Dr Alan Gadian gave a keynote speech at the Students for Exploration and Development of Space International Conference (SEDSIC) on the topic on gravity waves, and the effects on the upper atmosphere. The conference was in India and Dr Gadian, along with Director of the ISRO (Indian Space Research Organisation) were both presented with a tree planted in their honour (Pictured Right).



The AIITS Cloud Probe

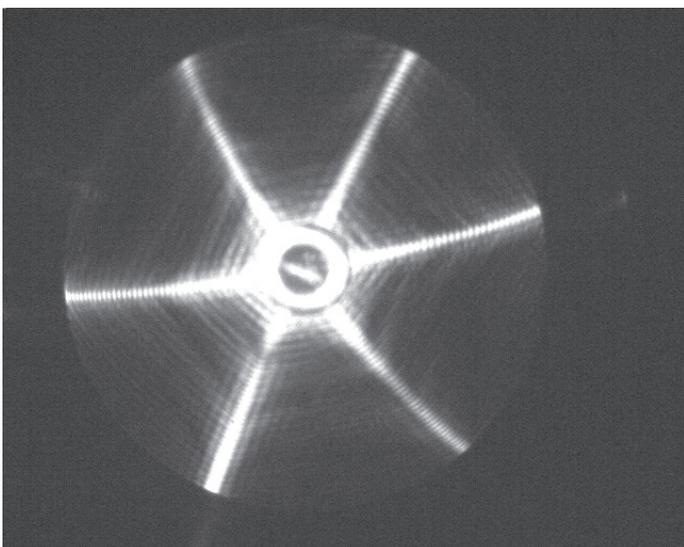
aboard the NASA Global Hawk

NCAS Scientist, Dr James Dorsey from the University of Manchester has been working to develop a cloud probe from concept to prototype, which is now flying on board the NASA Global Hawk.



The Aerosol Ice Interface Transition Spectrometer, or AIITS was jointly developed by UK's Universities of Hertfordshire and Manchester. It measures particles including dust, water droplets and ice crystals and allows the scientists to measure the scattering properties of tiny particles in the air (aerosols) and cirrus clouds.

Dr James Dorsey highlights one of the early results to come from the AIITS Cloud Probe. Pictured below is a hexagonal ice crystal that was observed at the level of the tropopause. James says "It's about 85um point to point, and is one of the cleanest images ever



recorded in the air, probably due to the low ice crystal concentration in that region of the atmosphere."

Scientists expect that this type of observation, combined with others to provide valuable new information about the formation and impact of extensive, thin cirrus clouds in the tropical tropopause layer. These clouds moderate transport of water vapour from the troposphere to the stratosphere, and their effect on global climate is poorly understood.

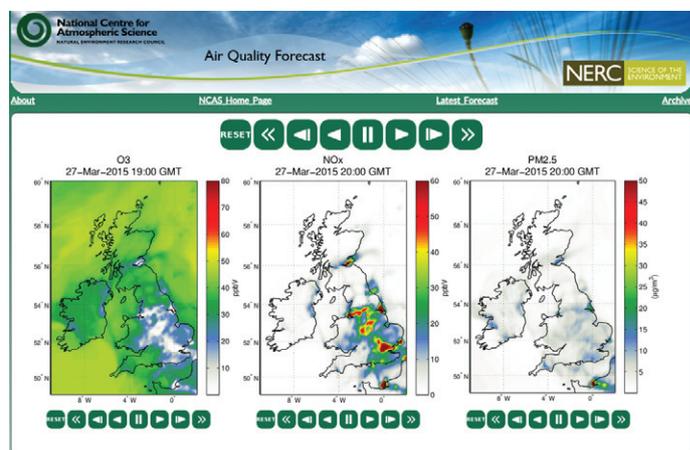
Photo - James Dorsey beneath the Global Hawk - Courtesy of Martin Gallagher

Photo - Hexagonal Ice crystal observed at tropopause level but AIITS on the Global Hawk.

Visit www.ncas.ac.uk for the full story.

NCAS Air Quality Forecast

The NCAS Air Quality Forecast (AQF) system is a research tool used by the scientific community interested in the prediction of air quality related pollutant species over the UK. It provides a three day forecast of Ozone (O3), Oxides of Nitrogen (NOx) and Particulate Matter (PM2.5). The forecast can be viewed at <https://sci.ncas.ac.uk/airquality/>



The NCAS AQF system, is operated by the Centre of Atmospheric and Instrumentation Research, University of Hertfordshire and the forecasts are publicly available. Please note that DEFRA operate the official air quality forecast system for public information in the UK.

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Setting the Standard

Collaborating for success

(EASA), tasked with building a mobile reference sampling system for EASA. This forms one of only three reference systems in the world (European, Swiss and North American). Not only must an engine manufacturer follow the standard for building and operating a measurement system, they must demonstrate their system is consistent with one of the reference systems. The European reference system that NCAS has worked to design and validate is shown in the picture at the bottom of the page.

There are issues with the nvPM mass measurements. Discrepancies between two measurement techniques is now a roadblock to the publication of the international standard.

The two main techniques for nmPM mass are a method based on photo-acoustic measurements, and a method using laser induced incandescence.

Data from on-engine comparisons showed that the incandescence measurements are low with respect to the photo-acoustic. It is unclear what is causing this difference and which method is correct, if indeed either is.

Picture Below - The EU nvPM reference system which NCAS helped to design and validate.



Picture Above - The MANTRA team at Rolls Royce

Over the past 6 years, NCAS has been involved in defining the metrology for the new regulation of aircraft engine emissions. From 2016, all new aircraft engines with >27kN thrust will be regulated by the number and mass of non-volatile particulate matter (nvPM).

Engine manufacturers will be required to measure and report the concentrations of nvPM to their regulatory bodies and ultimately into a publicly available International Civil Aviation Organisation (ICAO) database. To ensure that measurements from two different manufacturers are comparable, an international standard on the metrology of measurements is being developed.

The standard prescribes every aspect of the sampling system, which includes the permissible measurement techniques, line lengths, flowrates, temperatures and materials, maximum bend radii, frequency of calibration, dilution factors and so on. All these factors are based on measurement data from several international projects and collaboration teams working together to form the standard methodology.

As well as developing the standard, NCAS was part of a consortium which was headed by Rolls Royce and funded by the European Aviation Safety Agency



This collaboration and the success of this project has shown that NCAS, with its expertise and the cutting edge AMF equipment has lead to becoming involved in an international project called MANTRA

(Mass Assessment of nvPM Technology Readiness for Aviation). Mantra is funded by Transport Canada, National Research Council of Canada and Rolls-Royce.

Currently the MANTRA project are running small scale gas turbine engine testing, at Rolls Royce in Derby, to try and elucidate the differences in the two nvPM measurement techniques.

This collaboration, whilst it may not be seen as a core NCAS activity, demonstrates the potential for NCAS to diversify its resources, expertise and facilities into other sectors and areas of science and technology.

Picture above right - NCAS staff searching for soot!

Contact AMF Instrument Scientist Paul I Williams from Manchester if you would like to discuss this project in more detail. paul.i.williams@ncas.ac.uk



Short Course Practical Aerosol Science

8th-10th June, 2015, Manchester

Want to learn about aerosol measurement? This short course in practical aerosol science aims to deliver an introductory understanding of the challenges faced with aerosol measurements. Sampling ambient particles can be extremely challenging and answering a simple question like 'how big is the particle' depends on what instrument was used to measure it. The course will be split between lectures on the theory and application of aerosol measurements and techniques and practical, hands on demonstrations in a laboratory. The goal of the course is to provide a theoretical understanding of aerosol properties, examples of how these properties are measured and hands on experience in aerosol measurements.

The course is run over 2.5 days. The first day consists of lectures on fundamental aerosol science and provides the background needed for the subsequent talks. The remaining days are split between lectures in the morning and practical sessions in the afternoon. In addition to the standard lectures, two plenary sessions are being presented by two leading UK researchers.

Find out more and register online <https://www.ncas.ac.uk/index.php/en/2156>

Register by the 8th of May to secure a place on this course.



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