



# Barometer

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Data  
visualisation  
Useful. Beautiful. Data.



Weather and climate know no borders, which is why the Met Office is set firmly in the global context, says **Andy Brown**, Met Office Director of Science.

# Welcome

Contributing at home and abroad

**T**hese days, it is clear that the benefits science can bring are reaching to every corner of the world. The Met Office is part of this science success story, forming relationships to help people across the globe, transforming science into services that make real differences to people's lives.

For instance, at the World Meteorological Congress earlier this year, Met Office Chief Executive, Rob Varley, was elected to Executive Committee. This connection links well with our aim to be the global partner of choice for weather and climate services.

Barometer is full of examples of working collaboratively and internationally. One practical and positive application our science is the new International Expert Meteorologists team which is helping other national meteorological services develop their capability for the safety and prosperity of local populations (see page 7).

Closer to home, in Europe, we have many strategic relationships with the national meteorological services of our near neighbours. On page 15, an interview with Professor Gerhard Adrian, President of Germany's national meteorological service – Deutscher Wetterdienst (DWD), highlights one of many important European collaborative relationships.

Another example of our collaboration with national meteorological services in Europe is Copernicus, the European Union's flagship programme which monitors the Earth's environment. Among other contributions, we will provide climate, atmospheric and marine data to the programme. Find out more on page 3.

An integral part of the Met Office is the Hadley Centre, which celebrates its 25th anniversary this year (see page 3). Over that time, the Met Office Hadley Centre has

conducted world-leading science to answer hugely challenging questions. Now there is an increasing focus on translating that science into services to help governments, businesses and society make decisions.

This year also sees the 50th anniversary of the first operational Numerical Weather Prediction (NWP) system. To mark the occasion, the Royal Meteorological Society is holding its national meeting at the Met Office in November. Numerical models are at the heart of our forecasts and products, and their accuracy has improved dramatically over the years. Working to improve them further is a top priority for our scientists and I was delighted to see the recent work to enhance the representation of physical processes in our regional forecast models (page 21). Due to the unique way in which we develop and use the Met Office Unified Model for both weather and climate, these improvements will also flow through to improve our climate predictions.

Although it is good to remember the journey that has brought us to this point, we are constantly exploring different ways of working. The new Met Office Informatics Lab (see page 13) is a forward looking venture aiming to extract the maximum value from our new supercomputer and the masses of data it will produce. The Lab is addressing the important question of how to turn data into something useful people can act on. Huge science gains can be achieved from working in this way, representing the weather in different and ever more useful ways.

Just like the Met Office, The Lab is committed to collaborative working. Looking ahead, as the consequences, challenges and opportunities of weather and climate are so often global, we will continue to work alongside partners in the UK but also co-ordinate efforts with a range of organisations overseas – making sure we contribute at home and abroad.

*Andy Brown*

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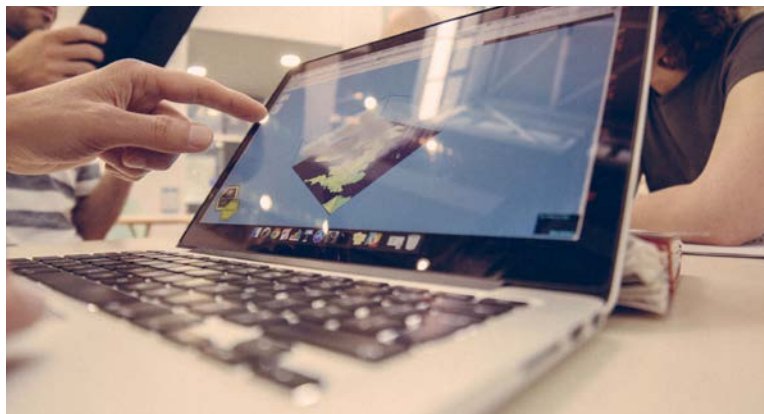


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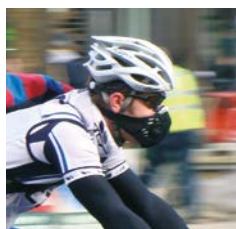
The DWD's President, Professor Gerhard Adrian, talks to us about the vital collaboration between themselves, the Met Office and other countries.



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## In brief

A quick look at the news and updates from around the world of the Met Office.

### Copernicus

Environmental observations are of crucial importance, helping understanding of the state of our planet and how its climate is changing. The information is also essential in monitoring and reviewing the role of human activities such as land-use, greenhouse gas emissions, water quality, marine pollution, and population movement.

Copernicus, previously known as Global Monitoring for Environment and Security (GMES), is the European Union's flagship programme, monitoring the Earth's environment, using satellite and in-situ observations. It will provide Governments, academia, the private sector and the public with reliable information through services addressing six areas: land, marine, atmosphere, climate change, emergency management and security. In particular, timely, quality assured information is needed by Governments to develop environmental policies, and to make critical decisions.

Last year, the European Commission placed contracts with European institutions to coordinate and manage six new satellites missions, and to develop and deliver operational public services in each of the six areas. The European meteorological community is playing an important role. EUMETSAT will manage three of the six new satellites, and the European Centre for Medium-Range Weather Forecasts (ECMWF) will coordinate the Atmosphere Monitoring and Climate Change Services.

As an operational weather and climate service provider the Met Office, with partner national meteorological services in Europe, is playing an integral role in making Copernicus a success. The Met Office will provide raw climate, atmospheric and marine data to the Copernicus programme, operate significant parts of the Marine Service, and aims to be a service provider for elements of the Climate and Atmospheric Service. 📄

**i Find out more at [www.copernicus.eu](http://www.copernicus.eu)**

### Met Office Hadley Centre marks 25th anniversary



The Met Office Hadley Centre celebrated 25 years at the forefront of global climate science in May.

From developing some of the world's most sophisticated climate models, to contributing to breakthroughs in global understanding of the climate system, the Met Office Hadley Centre has been pivotal in maintaining the UK's reputation as a leader in climate research.

Opened by then Prime Minister, Margaret Thatcher in May 1990, its scientists have since worked with thousands of peers from science institutions around the world to pioneer research that has shaped global understanding of the past, present and future climate and inform government policy.

Professor Stephen Belcher, Head of the Met Office Hadley Centre, said the 25th anniversary was "a great time to reflect on achievements and look forward to future discoveries." 📄



### Outstanding international collaboration

An Outstanding International Collaboration Award at the British Expertise Awards was given to the Met Office for its collaborative work.

The Met Office International Development team was delighted to win the Outstanding International Collaboration Award for work with the Adaptation Consortium 'Mainstreaming Climate Adaptation into Planning' in Kenya.

Delivered by the Adaptation (Ada) Consortium, the project aims to increase the access, use and benefits of climate information services to 2.4 million people

in Kenya. Partners include the Met Office, Christian Aid, the International Institute for Environment and Development (IIED), Kenya Meteorological Services and Kenya's National Drought Management Authority.

The project was funded with UK aid from the UK government within the Strengthening Adaptation and Resilience to Climate Change in Kenya plus (STARCK+) programme. Ada aims to enable access to climate finance and mainstream climate adaptation into planning, which strengthens climate resilience in arid and semi arid counties.



This is promoted through a combined approach which brings together County Adaptation Funds (CAFs) with improved Climate Information Services (CIS). 📄

**i Find out more about the Ada Consortium at [www.adaconsortium.org](http://www.adaconsortium.org)**

**📄 Read more about the climate information services for Kenya on page 17.**





# Benign, balmy, then **BOOM!**

Spring weather in the UK this year was fairly quiet, but at the end of June the heat was turned up right across Europe resulting in the hottest July day in the UK since records began, as well as some thunderstorms.



Overall Spring 2015 (March, April and May) was fairly unexceptional with the UK mean temperature close to average. March saw a mix of typical early spring weather. High pressure in April brought some dry, sunny and warm days whereas May was generally more unsettled with often cool and rather wet conditions. Spring rainfall was well above average in the north-west of the UK but below in the south-east.

At the start of June a low pressure system brought rain and unseasonably strong winds to the UK heralding the first day of summer. After this the month was much quieter but continued fairly cool in an often westerly or north-westerly flow. However, it became very warm at the end of the month.

## **European records broken**

In late June and early July the UK and Europe saw a period of record breaking hot weather. Heat building across Iberia spread northwards across France as a tropical continental air mass dominated the weather. Temperature records were broken in France, Germany and the Netherlands.

On 1 July 2015, 36.7 °C was recorded at Heathrow, making this the warmest July day for the UK since records began and the hottest day since 2003. The previous highest July temperature was 36.5 °C in July 2006 in Wisley, Surrey, while the current overall UK record is 38.5 °C at Faversham, Kent on 10 August 2003. Although Heathrow recorded the highest temperature in our observing network for a July day, several other weather stations across the country also broke their July records.

## **Handling the heat**

In the UK, the warm and humid spells of weather coincided with the start of the Wimbledon fortnight. We forecast temperatures well in advance, enabling people to prepare for the conditions.

Temperatures over 36 °C reported at any station in the UK observing network are very rare, with only a handful of such extremes in the historical record, including August 1911, August 1990, August 2003, July 2006 and July 2015. The major heatwave and drought of summer 1976 saw a highest recorded temperature of 35.9 °C but was a much longer duration event, whereas in contrast the heatwave of July 2015 was short-lived.

From 1 June to 15 September we provide a heat health watch service for Public Health England and health professionals and emergency planners so they can prepare in advance for any increases in demand for services.

## **Traditional thunder**

As is customary in the UK, the hot weather was accompanied by thunderstorms. Parts of the UK, especially the North East, had torrential downpours and thunderstorms with frequent lightning and hail the size of golf balls. Over a 34 hour period there were 19,525 lightning strikes, 15,273 of which were in Scotland. We issued a yellow warning, making the public aware of the chance of localised disruption. ⚡

# Have fun but take care

This summer, many of us will set out to enjoy outdoor activities. The Met Office provides a variety of forecasts to help you make the most of the conditions while staying safe.

When the sun comes out, for many people, it's time to play. The sun turns the outdoors into a giant playground, whether you like to go walking, cycling, swimming or just like to relax. Staying safe in the sun is just as important as enjoying it. For example, if you're on a long walk, make sure you have plenty of water. And, if you're walking your dog, make sure you consider their health and needs too.

## Check the pollen count

Another factor that could influence your enjoyment of time spent in the open air is hay fever. Although many of us love spending time outdoors, others spend their time struggling with symptoms of hay fever with itchy eyes and constant sneezing. Our pollen forecasts give people the vital information needed to help reduce the impact of pollen on their health.

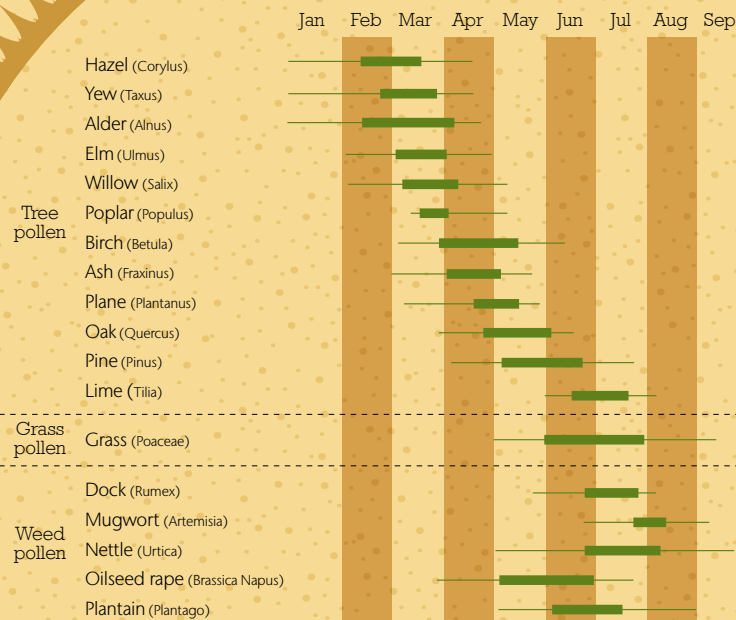
[www.metoffice.gov.uk/health/public/pollen-forecast](http://www.metoffice.gov.uk/health/public/pollen-forecast)

## Stay safe in the sun

Our UV index forecast gives the strength of the ultraviolet (UV) radiation from the sun, so you can take precautions to reduce the impact of UV on your health. Overexposure to the sun not only causes sunburn, but can also cause skin cancer and cataracts. Wearing sunscreen, sunglasses and a hat is a good idea if the UV index is high. While the UV forecast is a useful guide, always use common sense and be cautious, especially when it comes to young children or people with sensitive skin. Remember the saying, "Slip, slap, slop." Slip on some sun glasses, slap on a hat and slop on some sun screen – and remember to drink too – slurp!

[www.metoffice.gov.uk/health/public/uvindex](http://www.metoffice.gov.uk/health/public/uvindex)

## Any way the wind blows



This infographic shows the different types of pollen that are released throughout the year. Working with Public Health England, we looked at specific types of pollen for the South West of England – and produced maps for six key types of pollen.

[www.metoffice.gov.uk/health/professionals/sw-pollen-maps](http://www.metoffice.gov.uk/health/professionals/sw-pollen-maps)

Different types of pollen which can cause hay fever and other allergies are released throughout the year. Our pollen forecast provides pollen counts five days ahead which can help manage hay fever symptoms.

We manage the only pollen count monitoring network in the UK using information from our network, our weather data and expertise from organisations such as the National Pollen and Aerobiological Unit and PollenUK to produce forecasts that help support allergy and hay fever sufferers through the most difficult time of the year.



## Getting out and about

Whatever the summer throws at us, the Met Office keeps an eye on things so you can plan your activities. Here are just some of the types of Met Office forecasts:



## Marine forecasts:

Sailing, boating, surfing

**i** [www.metoffice.gov.uk/public/weather/marine](http://www.metoffice.gov.uk/public/weather/marine)



## Mountain forecasts:

Walking, mountain biking

**i** [www.metoffice.gov.uk/public/weather/mountain-forecast](http://www.metoffice.gov.uk/public/weather/mountain-forecast)



## National Park Forecasts:

Days out spent enjoying the scenery or pushing for the summit – the choice is yours. We provide forecasts for all 15 National Parks in the UK, as well as forecasts for the Mourne Mountains in Northern Ireland.

**i** [www.metoffice.gov.uk/public/weather/national-parks](http://www.metoffice.gov.uk/public/weather/national-parks)



## Wild swimming

Nothing beats swimming outside on a summer's day. "Wherever you are in the UK it is likely there's a lake, river, llyn, tarn, beach or lochs ready to welcome you," says Kate Rew, author of *Wild Swim* and founder of the Outdoor Swimming Society.

"Britain has a wonderful variety of swimming experiences to offer, such as waterfalls and dipping spots in the hills, tidal pools where the sea is captured and the swimmer is protected from unruly waves, and lakesides and river meadows that make natural swimming and picnicking spots and have inland beaches that are ideal for children."

The Outdoor Swimming Society is the world's biggest collective of wild swimmers, and has both a map of swim spots around the world ([wildswim.com](http://wildswim.com)) and plenty of information on understanding water so you can learn to swim outdoors safely - see 'swimming outdoors' on the OSS site, [www.outdoorswimmingsociety.com](http://www.outdoorswimmingsociety.com).

"As much common sense applies to swimming outdoors safely as any other outdoor activity," says Kate. "You need to be mindful of your own abilities and knowledge of watery environments and build up to adventurous swims gradually. A safe place to start is swimming along the shore of a lake, or in a river pool that runs to shallow, or on a lifeguarded beach. It's always worth asking locals before you get in."

Weather changes everything! Rains fall, rivers rise, currents strengthen, rocks move, temperatures drop... So always assess conditions yourself before you get in. And enjoy! Swimming has an ability to transport you in a way few other things in life do."

**Beach forecasts** – accessible from the Met Office website home page through the widget 'Find a weather forecast'.

**Tide time information** – available for over 500 beaches around the UK, updated every hour at [www.metoffice.gov.uk/public/weather/tide-times](http://www.metoffice.gov.uk/public/weather/tide-times)



## Rip Current Indicator

A trial of a Rip Current Indicator at several lifeguarded beaches around the UK is planned with the RNLI, Surf Life Saving GB and Plymouth University and Portsea Rescue. Adrian Mayhew from Surf Life Saving GB said, "This new initiative has the potential to help make beaches safer and more enjoyable places for everyone. It's best to swim at a lifeguarded area of the beach and talk to a lifeguard to get safe advice."

While targeted at professionals rather than the public, the Rip Current Indicator is an example of an evolving capability that could help to save lives. As Thomas Walters from RNLI describes: "The RNLI seeks to use the latest science to help us save as many lives as possible. The pilot of a rip current forecast is helping our lifeguards to plan their resourcing and to advise members of the public on how they can enjoy beaches safely."

## What did you get up to this summer?

Tell us, as the summer Weather Observations Website (WOW) launches in September. **i** [wow.metoffice.gov.uk](http://wow.metoffice.gov.uk)







2013 saw 6,000 killed and millions made homeless, when Tropical Storm Haiyan devastated the Philippines. This pivotal event catalysed the launch of a new Met Office team to better support national meteorological services – a team of International Expert Meteorologists – headed up by Bob Turner.

# International





severity brought things forward, albeit with dual-role consultants who spend 50% of their time on international matters. It's about moving away from the idea of 'here's your weather forecast' to 'here's your weather forecast, its consequences – and how you can ensure the comms chain flows'."

"The concept of international meteorologists had been on the Met Office's drawing board for some time," explains Bob, whose six-strong team combines core operational and broader, non-operational experience, "but we'd never previously had the resources to make it happen. Haiyan's

just 12 months later, when Tropical Storm Hagupit hit in December 2014. This time, though, PAGASA was better able to validate its forecasts through support from the Met Office's internal operational team – the Global Guidance Unit (GGU) – and by making the most of its recently installed numerical modelling capability.

Crucially, the Philippines Government was also widely praised for the way it managed communications surrounding the Hagupit storm.

### Mutually supportive

The International Expert Meteorologists' role sits between the GGU, with which it has a two-way relationship, and the Met Office's more business-focused International Development team. The GGU keeps a close eye on potentially threatening weather events around the world, filtering relevant content from its daily Global Weather Assessment for internal Met Office customers and various government departments. At the same time, international meteorologists out in

an International Expert Meteorologists team member with meteorology and hydrology expertise travel to Mozambique to assess how well its national met service and responding agencies had performed during very heavy seasonal floods in the previous two years.

Another project in Vietnam is accessing UK government IFUSE funding (designed to support economic growth in developing countries through UK expertise) to help develop its warning and informing capability. With the GGU already advising Nepal on the impact of weather events in a fragile, post-earthquake environment, the international meteorologists' team is already looking ahead to the chance to help the country better prepare in future.

### Taking the long view

"Above all, it's a long-term plan – building up relationships that over many decades could see many national meteorological services having a synergistic partnership with the Met Office.

# Expert Meteorologists

### Tried and tested

Initial work commissioned by the Philippines Government in the wake of Haiyan focused on helping the Philippine Atmospheric, Geophysical and Astronomical Administration (PAGASA) better respond should such a disaster strike again. Early initiatives to improve warnings for Philippines disaster response agencies and the public were tested for real

the field (advised on protocol and any local sensitivities by the Met Office's International Relations team), help GGU colleagues assess risks and prioritise efforts to maximise local impact.

"It's a mutually supportive approach," adds Chief Operational Meteorologist, Dr Will Lang. "Given the number of staff who are, or have been, in both teams, there's a very strong bond between them. What we have realised in recent years is that operational, diplomatic and business functions work best to tackle international matters when there's joined-up thinking."

### Winning strategy

The International Expert Meteorologists' early successes in the Philippines have led to rapid expansion and formed a solid foundation for working with other vulnerable countries.

For example, a recent World Bank project has been looking at best practice in managing river flooding throughout the world with a special focus on the Rhine, Mekong and Limpopo systems. June 2015 then saw

The exchange of ideas is also a vital element. Others often have local expertise and understanding that we don't, for example that knowledge can help develop the way our models deal with tropical areas." As the number of countries that the International Expert Meteorologists support grows – alongside their depth of knowledge about them and an inexorable rise in extreme weather events – so will the need to add to resources.

"Within five to ten years," adds Bob, "I expect to see a shift towards dedicated International Expert Meteorologists – and more of them – who can spend 100% of their working day on the task, rather than have split responsibilities. The plain fact is this: keeping tabs on the entire world is tricky, but the demand for our expertise is only likely to grow." Bob continues, "We aspire to be a partner of choice with the goal of enabling protection, improving well being and increasing prosperity for people – wherever they are." 🌿

“Early successes for International Expert Meteorologists in the Philippines have led to rapid expansion – and formed a solid foundation for working with other vulnerable countries.”



# Training the trade

For 75 years the Met Office College has turned new recruits into top meteorologists. Today, training also helps industries around the world get to grips with forecasts – and deal with whatever’s on the horizon.



Contemporary forecasting is incredibly sophisticated. Using state-of-the-art technologies, numerical models and satellites, the Met Office can accurately forecast what will happen today, tomorrow and days ahead – which is extremely valuable for businesses affected by the weather. But without the right training, the detailed

reports they receive can be difficult to interpret. Which is where the Met Office College comes into its own.

## Right move, right time

A prime example is the road industry. “They get quite a complex five-day report from us, from general information right down to what the road surface temperature will be,” explains Mike Mason, Met Office Customer Training Manager. “They use that information to decide what they’re going to do in the next 24 hours – and the coming week.”

If snow or ice is forecast, for example, a highways team has to make a series of judgement calls: when to mobilise manpower, whether snow ploughs are needed, how much drift there will be and how many grams of salt will be needed per square metre of road. Mike puts things in perspective:

“That kind of operation could cost an average-sized council between £10,000 and £30,000 in a single night. If they can interpret the forecasts correctly and go out to treat the roads, that’s money well spent.





“...I was due to run a course the other side of the Pennines, the Met Office predicted snow the next morning, so I quickly got up and travelled overnight. That day, forecasting actually helped me deliver forecasting training – so it all comes full circle.”

But getting things wrong can have huge implications on budgets, efficiencies and, ultimately, safety.”

#### Travelling the globe

The College doesn't just benefit industry across the UK. Met Office trainers travel the globe, passing on best practice to international weather services.

In Manila recently, Mike and his team delivered a 'train the trainer' workshop for the national weather service, Philippines Atmospheric Geophysical Astronomical Services Administration (PAGASA). As part of this, they demonstrated the Met Office's multi-hazard concept, which provides the general public natural hazard warnings. From that one session there was a domino effect and those few delegates went on to coach their stakeholders and emergency responders. This has helped PAGASA further develop its warning service for the Philippines.

But there's no one-size-fits-all approach, especially when training overseas. Before going to Rwanda, for example, College coaches thought carefully about the challenges different industries within that country face – such as huge thunderstorms, landslides and flash flooding. And of course, no matter how careful the preparations, flexibility is often needed. “We always plan what we're going to cover, but sometimes you have to change tack when you get there and see what they're doing on the ground,” says Mike.

#### 75 years of training

When the Met Office College was founded in 1939, learning followed a 'chalk and talk' approach. But that, along with the nature of forecasting, has changed. Now, Mike says, “Go into the College and you'll see people using visualisation tools, models, satellites and radar observations”. And the College's blended learning – where individuals fit online course modules around their day-to-day jobs – is proving particularly fruitful.

For Mike, seeing companies return year after year to enhance their forecasting skills is the real success story. “People coming back full of enthusiasm, telling us how useful training was and how it impacted on their decision making, is really gratifying.”

Of course, coaching in-house forecasters has its own benefits for Mike and his colleagues. They often find themselves at the mercy of the weather and relying on the forecasts of the very people they trained to become meteorologists.

“Last year I was due to run a course the other side of the Pennines,” Mike remembers. “The Met Office predicted snow the next morning, so I quickly got up and travelled overnight. That day, forecasting actually helped me deliver forecasting training – so it all comes full circle.”



# e.on

Customer testimonial

#### The power of training

For energy suppliers, being able to accurately interpret weather forecasts is vital. As James Middleton, HV Operations Engineer for E.ON explains: “Weather and sea state are central to how offshore wind farms operate, for example. We make decisions and evolve maintenance plans on a daily basis, based on forecasts.”

E.ON knew that having a solid grounding in forecasting could help maximise the efficiency of wind farms. That led them to the Met Office College's Introduction to Meteorology for Renewable Energy Professionals course.

The course began with an in-depth overview of the factors that drive UK weather, moving on to focus on how those factors can affect the particular weather and sea conditions E.ON see at Humber Gateway – their wind farm. Delegates then examined the potential effects on that site's operation.

“One exercise involved reviewing the forecast for a day during the course. As we did that, a trough (an area of low atmospheric pressure) appeared right over our operations and maintenance base in Grimsby, in the form of a thunderstorm with hail,” James remembers. “Before the course I had little knowledge of a trough, but as that particular storm passed I came to understand the forecast, the mechanism driving that weather feature and the impact it would have on our wind farm operations. That really cemented things for me.”

E.ON employees came away with a detailed understanding of the weather. That understanding is continuing to have a positive impact, influencing the decisions E.ON makes daily about wind farm operation.



# On the wo



Every year, the Met Office supports the British Antarctic Survey's field work by forecasting on location in one of the world's most challenging environments.

**T**he British Antarctic Survey (BAS) is one of the world's leading environmental research centres, responsible for the UK's national scientific activities in Antarctica. Every summer, it makes the most of the season to advance its research programme through field operations across the Western Antarctic. The programme relies on accurate forecasting – and here is where the Met Office plays a critical role.

A successful season of field operations relies heavily on the ability of BAS to transport scientists, engineers, mountaineers, large equipment and fuel across Western Antarctica – predominantly by plane. In contrast to the airports, runways and computerised landing equipment of the civilised world, Western Antarctica has only a few basic landing strips, mostly made out of snow and ice, making landing and takeoff far more weather dependent than usual. None of these flights can safely





# World's edge

“ You have to infer between lots of different channels of satellite imagery to pick up the difference between ice and water droplets.”

operate without the support of a skilled forecaster. So, each year, an experienced Met Office forecaster arrives on the first flight of the season – forecasting their own inbound flight – and leaves on the last.

## A forecasting challenge

The challenges of forecasting in the Antarctic are great. It is a vast area, extending from the South Pole to South America – and the weather is extreme. Antarctica is the highest, driest, coldest and windiest continent on planet and there are only a couple of fairly coarse resolution weather models for the area.

Satellite imagery is also sparse as the forecaster has to rely on polar orbiters for satellite pictures; these do a 'swipe' of the planet just twice in the morning, and again in the afternoon. Field parties also call in each day with their own observations, but the forecaster has to keep in mind the challenge of making accurate observations on flat white ice, where distances and topography are hard to gauge.

The forecaster also has to be highly skilled at reading satellite pictures: “The clouds are white, the ground is white, so the pictures are white,” explains Laura Paterson, Deputy Chief Meteorologist at the Met Office. “You have to infer between lots of different channels of satellite imagery to pick up the difference between ice and water droplets.”

It takes tremendous skill, which is why the forecaster must have previously

gained experience in the Falklands, which experiences similarly severe and fast changing weather. Also, the first forecaster to begin the season will have spent time at Rothera in the past. They are then able to train up their replacement halfway through the season, before returning home.

Over the season, the forecaster works closely with BAS' Field Operations Manager, meteorologists and Chief Pilot, forecasting primarily for the BAS flights, but also for the various field parties camping around the Western Antarctic, and occasionally for ships as well. As they get an understanding of the research programme and what's required, they are able to help the BAS Field Operations Manager and Chief Pilot prioritise tasks according to the weather windows available. This helps BAS plan and work more efficiently through the season. “We just would not be able to keep aircraft flying

and stay on track with the field programme if we didn't have the forecaster on the station. It's invaluable,” explains Simon Garrod, Deputy Operations Manager at BAS.

## A symbiotic partnership

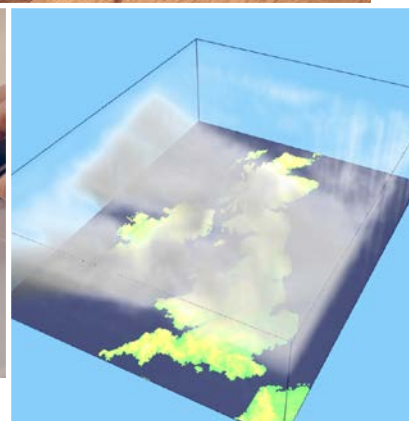
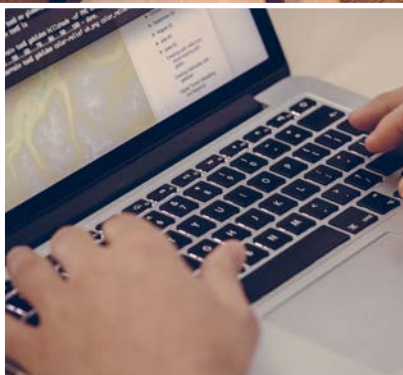
The benefits to the Met Office are equally significant. The Dash 7 aircraft reports wind and temperature data at specified waypoints and this valuable data goes into the Met Office supercomputer, along with official observations carried out by highly skilled BAS meteorologists. The Met Office also collates information during the season to use for the future. For years, BAS and the Met Office have helped one another push the boundaries of research. It's a partnership that's set to continue for years to come. 🌊

Image credits: P.Bucktrout (BAS).



# Data visualisation

Useful. Beautiful. Data.



From paper charts full of numbers and arrows to today's digital forecasts, the way the weather is represented has changed a lot over the years. But what will weather information of the future look like?

New technology comes with the opportunity to represent the weather in ever more useful and exciting ways. This is one of the aspects that inspired the creation of the Met Office Informatics Lab – a team of scientists, coders and designers who work together to create new ways to make environmental science and data useful. Alberto Arribas, Head of the Informatics Lab, has a background in developing forecasting systems at the Met Office – an experience that has hugely influenced his work: “In my previous roles I would see so many exciting ideas that could have a real impact,” says Alberto “but it would take so long to get them outside of the Met Office for people in different sectors to use. The Informatics Lab aims to facilitate and make that process much faster by creating useful prototypes that can demonstrate what is possible.”

## Pushing the boundaries

The Informatics Lab opened on 1 April 2015, and their first project began in earnest: an interactive 3D visualisation of UK weather in a web browser using data pulled from the Met Office's highest resolution model, the UKV. This project was founded on a curiosity about what it would be like to step inside a weather model and see conditions form around you. For example, the visualisation could allow people to watch thermals rise from the earth's surface and condense into storm clouds – processes that are not currently shown in visual weather information such as daily forecasts. As part of this project, the team has created an interactive webpage that lets the user fly through the clouds, which people can test via the Informatics Lab website: [www.informaticslab.co.uk](http://www.informaticslab.co.uk).





The aim is for the completed visualisation to launch in November, coinciding with the 50th anniversary of the Met Office's first numerical weather forecast. Until then, the team will post their work in progress – which includes an interactive webpage that lets the user fly through the clouds – on the Informatics Lab website for people to test.

### Working together

Encouraging others to try out early versions of their projects is one part of the Lab's commitment to collaborative working and helps them identify areas for improvement as early as possible. But it's not just testing that calls for wider involvement – collaboration takes place from the very beginning of the process. The core team is made up of meteorologists, scientists, IT experts and designers – a varied skillset that means the Lab can take a project from concept through to implementation quickly and easily. They also have a wider team of associates both from within the Met Office and outside.

Having so many different perspectives to draw on has helped spark ideas for future projects – from ways for people to create personalised weather forecasts, to helping companies integrate weather data with operational systems.

"We want to make it as easy as possible for companies to draw on environmental information to make decisions," Alberto says. "For instance, a renewable energy company could combine meteorological data with information about energy demand, energy production, workforce availability and customer behaviour to better understand what possible scenarios they will be facing next week."

### Getting involved

There are plenty of opportunities to join in with the Lab's work, including testing prototypes or developing code via the website. 🌩️

**i** Visit [www.informaticslab.co.uk](http://www.informaticslab.co.uk) for more information.



# designstorm

INSPIRE // COLLABORATE // INNOVATE

## Inspiring the next generation

The Met Office is always looking for fresh ways to help people understand the weather – and an event called Design Storm earlier this year challenged university students to get involved.

Ross Middleham, Design Lead at the Met Office, set up the event as a way to give undergraduates an insight into working in the creative industry – and promote the role design plays at the Met Office. "I was keen to create something exciting that people could get involved with," says Ross. "I also wanted to showcase the Met Office as an innovative, creative place to work."

The daylong event included talks from industry professionals, before the students were set their challenge: to take webpages about snow, rain, clouds and extreme weather from the Met Office website and turn them into shareable content that could be put out on social media.

The day focussed on social media because, as Ross points out, "it gives us more freedom to be creative and use new technologies. It's also a way to get important information out to as many people as possible in an easily understandable way."

The ideas pitched back to the group included a working prototype of an augmented reality cloud viewer, along with an animated character called Raindrop Man, who could teach children about the water cycle and the importance of rainfall. "It was great to bring together different people with different ideas," Ross says. "You never know what the outcome might be – which is just the sort of thing we do in the Informatics Lab."

Twitter coverage of Design Storm was estimated to reach over 14,000 people, and Ross has since been invited to speak at universities and attend students' final year design shows. He hopes to make Design Storm an annual event, and possibly one that could have an even wider reach across other areas of the government.





# Pulling together

Two of Europe's largest national meteorological services – Germany's Deutscher Wetterdienst (DWD) and the Met Office – represent very different organisational approaches. But, given the weather has no respect for national boundaries, their collaboration, together with other countries, is vital for coordinated policy and services.

We talk to the DWD's Professor **Gerhard Adrian**.





**T**he main task for both the Met Office and the DWD is to support the protection of lives and property of their respective citizens through weather and climate information. Both operate similar systems for global and regional forecasting – including climate monitoring – but reflect contrasting philosophies.

“As a government body of the German Federal Republic, the DWD is involved in practically zero commercial activity,” explains Professor Gerhard Adrian, the organisation’s president based in Offenbach. “Our main users are the 16 German ‘Länder’ or federal states, to which we provide free services including weather warnings and flood support. The Met Office, on the other hand, is a Trading Fund that gives it far more opportunity to provide services to a much wider range of paying customers, including to customers outside of the UK.”

Another key difference relates to the media profile of the German and UK organisations. While the Met Office is highly visible through its own platforms and forecasting work for the BBC, ITV and other media, the DWD is no longer associated with public service TV weather. In fact, Germany’s state TV channels employ their own, in-house meteorologists who acquire their data from the DWD.

### Common purpose

But while the German and UK national meteorological services may be different, both share a strong commitment to strengthening European and global

weather capabilities. This involves working with and on behalf of other meteorological partners to make the most of shared ideas and resources. “Along with Météo France, we and the Met Office provide some significant contributions to the international organisations which provide essential underpinning capabilities for our community, for example EUMETSAT,” says Professor Gerhard Adrian. “So this means we have a special responsibility to cooperate.”

Approximately every six months, the DWD, Met Office and Météo France meet to discuss key issues. The main focus is around interaction with the complex network of international meteorological organisations. This includes the European Centre for Medium-Range Weather Forecasts (ECMWF), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), EUMETNET (the 31-member economic interest group for meteorology) and the World Meteorological Organization (WMO).

Standing items for discussion include the European Commission and the new European Earth monitoring programme ‘Copernicus’. However, it’s European aviation that’s been one of the most productive areas for collective action in recent years.

### Reach for the skies

A key catalyst to aviation collaboration – in which Germany, France and the UK play leading roles – is the Single European Sky (SES) programme. This is the well-established initiative to coordinate the design, management and regulation of airspace throughout the European Common Aviation Area (ECAA).

“The basis for SES is the idea of harmonising cross border arrangements,” explains Ian Cameron, Met Office Head of Aviation, “so that when aircraft fly between two countries, air traffic management remains consistent. What’s clear is that weather should be dealt with on the same basis.”

A number of other significant aviation initiatives have emerged from SES and the Single European Skies ATM Research (SESAR) R&D programme. These include a joint branded air traffic weather product for Eurocontrol’s Network Manager portal that seamlessly integrates weather data from DWD, Météo France, the Met Office and Finnish Meteorological Institute FMI.

### Defining the European Meteorological Infrastructure

But it’s a particularly important collaboration around the European Meteorological Infrastructure (EMI) strategy that could have most impact on the way

“The challenge is to find a way to enable us all to provide first class met services for our national users though European Meteorological Infrastructure cooperation. So we’re working to identify areas where we can effectively pool and share competence.”

national meteorological services work together in the coming years. Led by a sub-group of EUMETNET members including the Met Office, DWD and Météo France, the project team is re-appraising the role of European national meteorological services within the context of EUMETSAT, ECMWF and the WMO.

As well as drawing up a mission and vision statement, other areas under consideration include deeper collaboration, monitoring systems, computing and data centres, numerical weather models and shared European meteorological infrastructures. The group will also be exploring the options for regional/thematic associations, new product development, data policy and the relationship with the private sector.

“The challenge,” says DWD’s Professor Adrian, “is to find a way to enable us all to provide first class meteorological services for our national users though EMI cooperation. So we’re working to identify areas where we can effectively pool and share competence.”

As budgets get tighter and the benefits of greater cooperation between national weather services grow ever more apparent, the evidence strongly suggests that ‘it’s good to talk’ – and that the collaboration model involving both large and smaller organisations has a very bright future. 🌩️





# Tackling climate change in Kenya



In the arid regions of Kenya, where whole communities rely on farming and livestock for survival, accurately predicting the weather – and especially the rainfall – is critical for survival. But as climate change increasingly affects their seasons, traditional ways of forecasting are getting harder, threatening lives and livelihoods. This is why the Met Office has been working with a range of organisations to improve access to weather and climate information in the region.

A typical family in rural Kenya is likely to have a smallholding of rain-fed crops alongside some livestock. Every day, they will need to make decisions based on the weather. Which livestock to keep and which to sell each season. When to migrate to new pastures. Which seed varieties are most likely to yield a good crop and which will demand the best prices at market.

Whether directly or indirectly, each of these decisions is based on the weather. And each can be made easier with better forecasting.

Since 2013, the Met Office has been working with partners from the Adaptation (Ada) Consortium (see box) to deliver improved access to weather and climate information services for Kenya's five most arid counties – Isiolo, Wajir, Garissa, Kitui and Makeuni. Populations in these areas especially – with their arid or semi-arid climates – have suffered the most from extreme climate variability within the country as a whole.

## Working together

The Ada Consortium is funded by the United Kingdom Department for International Development (DFID) within the Strengthening Adaptation and Resilience to Climate Change in Kenya plus – (STARCK+) programme. By working closely with the Kenya Meteorological Services (KMS), the initiative aims to support communities through planning, finance and knowledge sharing.

As confidence in weather forecasting is still low throughout Kenya's rural communities, the Ada consortium is adopting an approach where local decision making is informed by an approach that uses scientific forecasts but also recognises the value of traditional observations and knowledge. "The goal is to integrate the two sources of knowledge," says Met Office's International Development Manager Project Manager, Bill Leathes.

“Through improved access to finance and information we want people and institutions at a county level to take an active role in adaptation and development planning activities.”

"Local and scientific knowledge should be valued equally. It's only by evaluating both approaches together that we can have a dialogue, which we hope will result in usable climate information that is locally relevant and culturally valid."

## Forecasting and funding

The Consortium has developed a 'combined approach', for this project that focuses not only on better climate information services but also on funding to help communities adapt to changing weather patterns. To make sure this approach is implemented effectively, the project has worked closely with the Kenyan government to support them to make changes to the way climate change is managed at local levels.

"Through improved access to finance and information we want to support people and institutions at a county level to take an active role in adaptation and development planning activities," says Bill.

The work of the Met Office will be primarily focused on improvements to existing regular weather and climate information produced by KMS – specifically on seasonal timescales.

The Met Office will also closely monitor the initiative with the hope that successful elements can be rolled out among other counties within Kenya and elsewhere in the Greater Horn of Africa region.

The project is proving to be a great success in Kenya so far and has even led to the Met Office winning the Outstanding International Collaboration Award at the British Expertise International Awards 2015 (read more on page 3). By the end of 2017 the project expects that 3.3 million people across the five counties will be better equipped to cope with the effects of climate change. Of these, an estimated 800,000 will have benefited directly from the projects this programme has helped put in place. ➤

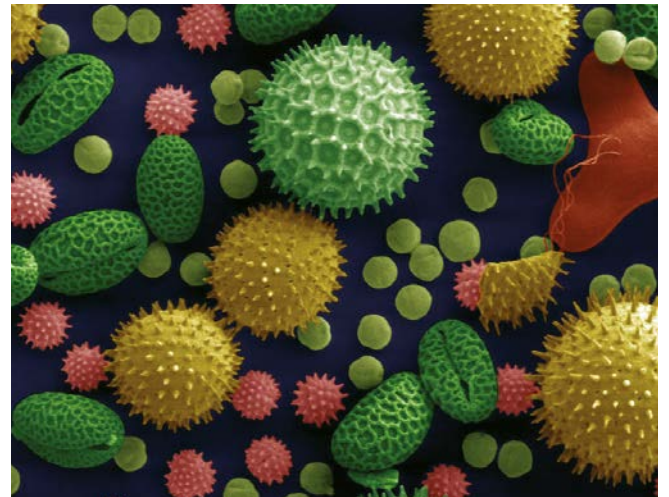
## The Ada Consortium

The Ada Consortium is led by the International Institute for Environment and Development (IIED) and consists of NGO partners (Christian Aid, Anglican Development Services (ADS), the Resources Advocacy Programme (RAP) and Womankind Kenya), Kenya Meteorological Services (KMS), and the Met Office (with King's College London and the University of Sussex). The project secretariat is based within and works closely with Kenya's National Drought Management Authority (NDMA).

[www.adaconsortium.org](http://www.adaconsortium.org)



# A new kind of





# partnership

How are climate change impacts affecting our health? An innovative new research partnership aims to provide some answers.

**T**his year, the National Institute of Health Research (NIHR) launched a new Health Protection Research Unit (HPRU) in Environmental Change and Health. Led by the London School of Hygiene and Tropical Medicine in partnership with Public Health England, it is bringing together experts across disciplines to explore possible impacts around three key themes: climate resilience, healthy cities and health and natural environment.

It is one of 13 funded HPRUs and the first of its kind to focus on environmental change in public health. The aspiration is that by furthering research and harvesting evidence in this emerging area, the programme will feed directly into public health policy to both

“We’re developing a lot of models to better understand the mechanisms by which these climate risks affect human health”

mitigate the negative impacts on human health, while maximising any benefits.

## A collaborative network

Interdisciplinary collaboration is at its heart: “We’re looking at very complex scenarios and questions,” explains Professor Lora Fleming from the European Centre for Environment and Human Health at University of Exeter Medical School. “If you want to address them, you have to get different institutions involved. Then you start finding new answers.”

For example, while there has been significant research done on air pollution and some work done on pollen, there has been relatively little research into the combination of both and how, when land use is also considered, they affect human health. This is one area the programme is currently exploring. The Met Office is collaborating on improving pollen forecasting by refining land use maps to identify the location of different types of trees and grass, while also examining the impact of their pollen on human health. They are also carrying out more

complex research on how pollen and air pollution interact with each other and the possible impacts of this.

## A shared focus

The research ranges from looking at how climate change might be impacting on diseases transmitted by creatures such as ticks and mosquitos, to mapping urban heat islands and using this to improve city environments. The scope is diverse but shares a common objective:

“We’re developing a lot of models to better understand the mechanisms by which these climate risks affect human health, and also the factors that mediate that risk,” explains Dr Sari Kovats, Director of the NIHR Health Protection Research Unit at the London School of Hygiene and Tropical Medicine. “There’s no point simply correlating weather to an outcome, we need to understand what decreases or increases vulnerability.” For example, it may be understood that a heatwave increases the risk of dying, but is this risk affected by the type of housing people live in, or is human behaviour a more significant factor?

Part of the initial research involves looking at where best to focus efforts. For instance, the Met Office has been involved in exploring the impact of heatwaves and cold weather on human health by first analysing past research.

“The aim is to look at what’s been done so far and try to make recommendations on how the HPRU can take this forward into the work we’re doing,” explains Peter Falloon, Manager for Climate Impacts Modelling at the Met Office. This includes making recommendations on how best to carry out future studies.

Ultimately, the hope is for the research to influence public health policy – and this is already beginning to happen, with some work now feeding directly into the Public Health England Heat Plan. The research unit is fully funded for the next five years, but this is an emerging area and the aspiration is to continue for years to come. 🌿

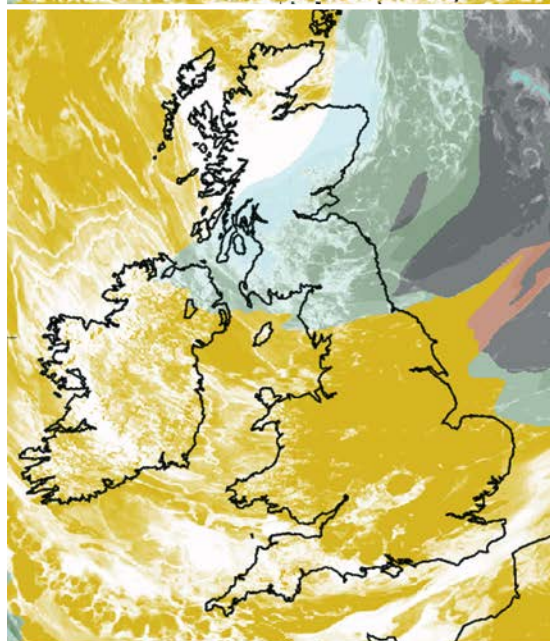
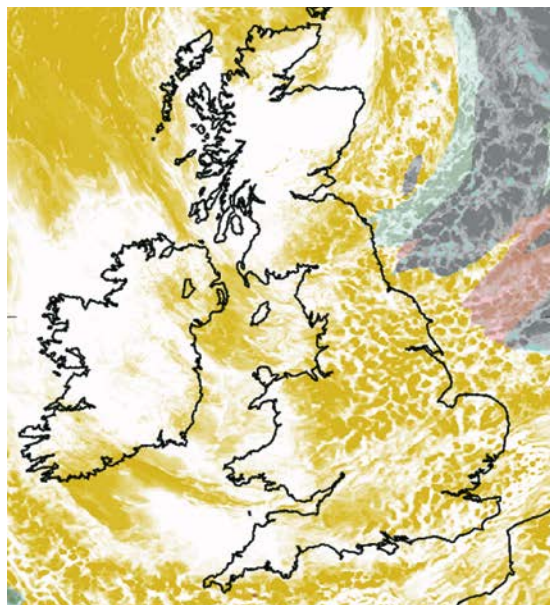


# Blending turbulence

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We have made significant enhancements to the representation of physical processes and parametrizations in our regional forecast models. One of the main changes is the blended turbulence scheme which improves the way the mixing generated by swirling gusts of wind – or turbulent eddies – is represented in the model. Professor Simon Vosper, Head of Atmospheric Processes and Parametrizations, describes the benefits these changes will bring.





**Top panel:** The model cloud in previous versions of the UKV, showing an unrealistic break-up of low cloud, particularly over land.

**Bottom panel:** The cloud in the new version of UKV, which includes the blended turbulence scheme. The improvements in the cloud forecasts are clear, with more extensive and realistic low cloud cover across the UK.

**W**e are continually developing our weather and climate models to improve their accuracy and provide new capability. As featured in a previous edition of Barometer, we made a major change to our global prediction systems last year by implementing the ENDGame dynamical core in global versions of the Met Office Unified Model.

ENDGame provides a more accurate solution to the equations of motion for the atmosphere and results in more detailed and reliable forecasts of weather features such as cyclones, fronts and jet stream winds. At the same time as implementing ENDGame we also introduced major improvements to the physical parametrizations in the global model – these represent the complex small-scale phenomena that cannot be explicitly resolved by the model, such as turbulence, cloud processes, solar heating and the effects of hills and small mountains.

### Improving regional forecast models

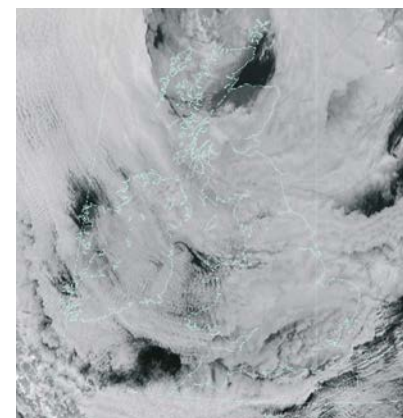
Following upgrading the global model, we introduced ENDGame dynamics into regional versions of the model. These configurations run at much higher resolution, providing detail on the scale of only a few kilometres, but over limited areas. The highest resolution version is the UKV model, which has a grid spacing of 1.5 km over the UK. This model is used to provide a detailed picture of our weather across the UK, and is able to forecast hazardous weather such as individual convective storms and account for how these are influenced by local features such as hills and valleys.

Another important effect of hills is the generation of lee waves – atmospheric wave patterns which can extend for hundreds of kilometres downwind of mountains. Lee waves can cause strong gusts at ground level and sometimes severe turbulence high in the air which can be a major hazard for aviation. One benefit of ENDGame is a much better representation of these waves which can now be reliably forecast using the UKV model.

### Enhancing physical parametrizations

One of the major improvements to the physical parametrizations in the regional models is the 'blended turbulence scheme' which improves the way the mixing generated by turbulent eddies is represented in the model.


Dr Adrian Lock, Met Office Science Fellow, describes the new scheme: "The changes mean that the scheme




**Figure:** Satellite imagery, along with UKV forecasts of cloud cover of different categories (low, medium, high clouds) during a stratocumulus period in February 2012. The satellite shows extensive low cloud across the UK.

is able to adapt as these eddies start to become explicitly resolved on the model grid. Along with improvements in how satellite observations of cloud are incorporated into the UKV analysis (our best estimate of the current state of the atmosphere) this leads to a better representation of stratocumulus cloud (sheets of low cloud which typically occur in high pressure systems). These clouds are important to get right, especially for near-surface temperature forecasts in the winter, as they restrict cooling of the surface at night, reducing the chance of fog or icing, for example."

While these model changes are beneficial, there is still much room for improvement. Over the coming years, enhancements to our supercomputer will enable us to explore the potential benefits to be gained from increasing the resolution of our regional models, including testing city-scale models with grid-spacings as fine as a few hundred metres.

However, to realise the full benefits of higher resolution it is vital that we make further improvements to the parametrization schemes. We will work with our UK and international partners to achieve this, challenging the models with networks of detailed observations so we can improve our weather and climate services into the next decade and beyond. 

 **Read the Science profile on Dr Adrian Lock, Met Office Science Fellow on the following pages.**



# Science profile

The Met Office employs professionals and experts who are constantly expanding the boundaries of weather and climate prediction. Here we meet one of them...

Dr Adrian Lock

Boundary Layer and Surface  
Processes team manager





**F**rom affecting where patches of frost will form in winter to causing sudden showers, clouds affect our weather in a whole variety of ways. Clouds are also particularly tricky to forecast accurately, but research being carried out by Adrian Lock and the Boundary Layer Processes team aims to change that.

The boundary layer is the part of the atmosphere directly affected by the earth's surface. Typically, as the ground warms during the day, heat is transported up into the atmosphere as thermals. This warm updraft cools as it rises until the moisture it carries condenses into clouds.

But exactly where and when clouds form depends on atmospheric turbulence caused by the interaction between that warm and cool air. It is also affected by instabilities resulting from wind flow and how physical features on the earth's surface alter its course. As Adrian points out, these factors can make forecasting cloud cover extremely difficult.

"A lot of the issues that we have with weather forecasts is being able to tell whether a cloud is going to form or not," he says. "This strongly links to how the transport of heat and moisture in the boundary layer is dealt with by the representation of turbulence within the model."

**“A lot of the issues that we have with weather forecasts is being able to tell whether a cloud is going to form or not.”**

#### Sunshine or showers?

The challenge of forecasting clouds, Adrian explains, is that they can occur on much smaller scales than can be represented by even the Met Office's highest resolution weather model.

"In the UK model you have grid squares that each represent an area of 1.5 km<sup>2</sup>. Even at that size it is still important to represent the effects of clouds that are too small to fill a grid square completely. To do that you need to know about the processes that cause those clouds to form."

A particular focus of Adrian's research is the formation of stratocumulus clouds – low level, thin clouds that are strongly influenced by atmospheric turbulence. Stratocumulus has a big impact on the climate we experience. In winter, they can act as a blanket and keep the surface relatively warm over night, which means forecasting them accurately is important for predicting surface temperatures and whether roads are likely to be icy.

To increase their understanding of how these processes vary from one place to another, Adrian's team is gathering detailed observations using weather instruments set up over an area of the countryside of just a few kilometres in size. They'll use this observational data to create a weather model representing that same area of countryside. If they can accurately represent real conditions at such a fine scale, Adrian says, "We can start to think about how we might do it better with the larger scale models currently used by the Met Office."

#### Clouds and climate change


Adrian's research into stratocumulus clouds has a global reach. Currently he's working with international research groups such as Global Atmospheric Systems Studies (GASS) and the Cloud Feedback Model Intercomparison Project (CFMIP). Together they are exploring how banks of stratocumulus clouds – that are persistent over large areas of the ocean – regulate our climate by reflecting sunlight back into space. They are also looking at whether global warming will cause those clouds to break up, and let more sunlight through.

To study this process, the groups use a very high-resolution simulator called the Large Eddy Model (LEM) to look at how moisture and air temperatures are transported by turbulence in the boundary layer. The LEM uses an incredibly fine grid of just 50 x 50 metre squares to capture the atmospheric eddies caused by hot air rising or cool air falling. Adrian explains that the LEM forms part of a three-tier model comparison system: "It acts as a crucial tool between larger scale models such as the Met Office Unified Model and observations that were made at one specific point. It's a way of generalising our observations so we can back up the Unified Model and explore where it can be improved."

**“It (the LEM) acts as a crucial tool between larger scale models such as the Met Office Unified Model and observations that were made at one specific point. It's a way of generalising our observations so we can back up the Unified Model and explore where it can be improved.”**

#### Capturing the imagination

Adrian's interest in the boundary layer began when, after joining the Met Office after finishing his maths degree, he was assigned to the boundary layer group. "I didn't know anything about it when I started, but I found the real world application of mathematical principles fascinating. I look out of the window and see the things I'm trying to represent in the weather model, like the wind rustling the treetops even when it's quite still at ground level."

After completing a PhD with the Met Office, Adrian went on to improve the parameters needed to represent this boundary layer, with a new framework that's been part of the UK weather model for almost 15 years. "To see a small contribution to the model performing well is something I'm really proud of," says Adrian. "But I've been looking for ways to move it forward ever since. There's always a different challenge to explore, and something new to learn." 



From climbing trees to diving with sharks, **Miranda Krestovnikoff** goes high and low in her adventures around the natural world. Whatever the role – television presenter, RSPB President or mum – she always tries to pass on a love of wildlife, and never lets the weather get the better of her.

**A**s a child, Miranda either spent her time in her family's copper beech tree, peering into the squirrel drey or inside, tending to her 'menagerie' of pets. So when it came to embarking on a degree, biology was a natural choice. After that, she began working as a runner in television. "I always wanted to communicate my passion for wildlife. That's why I went on to become a presenter."

#### Brief encounters

On screen, Miranda's been known to don camouflage to observe deer and search for insects in back gardens across the UK. And while she feels "any encounter with a wild animal is special", as a keen diver the experiences that really stick in her mind are underwater. "I had a particularly memorable time with grey seals around the Farne Islands. They're very intelligent and inquisitive, and looked at me in a puzzled way as if asking 'why do you need all this stuff?' Then they started pulling my diving kit – all the hoses and tubes – wondering, 'what does this bit do?'"

In her experience, getting up close and personal with animals is down to patience and, often, pure chance: "There's nothing you can do to engineer those encounters. Sometimes it's about sitting still for a very long time. Other times, it's just luck."

#### Whatever the weather

Patience is key when filming wildlife. But television's tight timescales can make that difficult. It means Miranda has to be outside in all conditions, often at the mercy of the weather. On one occasion, she found herself searching for basking sharks. Windy conditions made every wave look like a fin and, after day one, the crew hadn't captured a single shot. But thanks to perseverance, and a touch of good fortune, they spotted one right at the end of the final day – just as the captain was turning back to shore. "So" Miranda says, "we leapt into the water and had twenty minutes swimming with a shark."

Then there's rain. Despite her professional kit, Miranda once had to completely abandon filming deer for *The One Show*. "It was one of those rare times where it rains all day, non-stop. By ten in the morning the camera was so wet it stopped working, so we had to come in, pull it apart and use all the hotel hairdryers to dry it. I remember thinking, 'if the camera's giving up, that must be our cue to get a cup of tea.'" But days like that don't happen often. And Miranda rarely lets the weather take over. She says, "When I see a forecast that's cold and rainy, I don't change my plans, I just adapt. I put on my waterproofs and go out. Then consume large amounts of hot chocolate afterwards."

#### Making a connection

Her energy and enthusiasm for everything from blue sharks to blue tits have made Miranda a familiar face on television. "I try to show people what's actually outside their window. I want to get those

“As a presenter you don't encounter your audience much, because you're talking to camera. So it's really important to meet people face-to-face”

people to admire the beauty of creatures and show them how accessible wildlife is." Because, by taking notice of our surroundings, Miranda believes we pick up on transformations to our environment – and climate. "I think if people notice changes and those changes worry them, hopefully they'll do something. If we all make a small difference, surely it will add up to something big." For Miranda, the key to this is re-attaching people with the natural world: "I feel we've become disconnected from the environment around us. We need to make those connections again so we all care a little more about what we see."

#### Being green

A desire to reconnect people with nature has led Miranda to get involved with groups on a local and national scale. As Green Ambassador for Bristol, European Green Capital 2015, she's bringing her pragmatic, proactive approach to her hometown. "Rather than moaning about the lack of green space and transport issues, let's look at what we can do to make things better." At the same time, she's President of the Royal Society for the Protection of Birds (RSPB) – a role that involves everything from opening bird reserves to giving talks. But the thing she most enjoys is meeting people. "As a presenter you don't encounter your audience much, because you're talking to camera. So it's really important to meet people face-to-face and show them that the person they see on TV is as passionate about their subject in real life, too." 🌿



# Cloudy vision

Author and illustrator  
**Tom McLaughlin** talks  
about his new children's  
book, *The Cloudspotter*.

**T**om's new book, *The Cloudspotter*, published by Bloomsbury, taps into childhood memories of letting the mind wander, creating shapes and pictures from clouds in the sky.

Having written and drawn for Puffin, Oxford University Press, Simon & Schuster, Scholastic, The Guardian, Disney, Nickelodeon, Tom has also worked as a script writer and a character designer for several animation channels. His books, including *The Accidental Prime Minister*, *Diabolical Mr Tiddles* and *The Story Machine*, have been translated across Europe and South America.

## How did you get into authoring and drawing?

I have dyslexia and I write better than I read. I have good days and bad days, but even the simplest of picture books can be hard to read. I found drawing quite late. I was average at school

but suddenly found my thing at GCSE. It's important for kids to find their thing as we all need an identity. I'm lucky, as when my writing isn't working, I draw, and when drawing isn't working, I write. After college I was a political cartoonist for *The Western Morning News* before going freelance.

## Where do your ideas come from?

I spend most of my days drinking tea and dreaming up new stories. If I wasn't creating I would be miserable. A blank sheet of paper is a wonderful thing. No two ideas come from the same place. Some land fully formed at five in the morning as a picture in my head. Some are just a sense or a feeling. I push myself very hard – working ten hours a day is not uncommon – but it's important to have time to stare out of the window and come up with ideas.

## What was your inspiration for *The Cloudspotter*?

I wanted to capture the feeling of big skies and isolation. I also love the idea of turning something that isn't often recognised like cloudspotting into an official hobby or sport. As a little boy in the car I used to watch how clouds move, all the different shapes they make as they change.

## What was the biggest challenge in creating *The Cloudspotter*?

Kids love things they can spot – little secret bits that work the first and twentieth time when you open a book. While drawing lots of clouds that kids could spot, the hardest thing was drawing things that worked as clouds.

## What are you working on next?

The next book, about a boy who grows a planet, is already written. Obviously growing a planet is ridiculous but I had an image of a boy with a balloon on a string. I can't say too much more at the moment but it will be out sometime next year. ✍️

**i** Find out more at [www.tommclaughlin.co.uk](http://www.tommclaughlin.co.uk)

**i** As well as finding pictures in the sky, you can use our cloud spotting guide and video to help identify different types of clouds. [www.metoffice.gov.uk/learning/clouds/cloud-spotting-guide](http://www.metoffice.gov.uk/learning/clouds/cloud-spotting-guide)





# The Cloudspotter

“His real name was Franklin. But everyone called him The Cloudspotter... The Cloudspotter doesn’t have many friends. He spends his time, all by himself, spotting not just clouds but adventures in the sky. This way, he doesn’t feel so alone. Then, one day, an unexpected visitor appears in his adventures and it throws everything up in the air. Could it be that two cloudspotters are better than one?”

The new, beautifully illustrated, children’s picture book from Tom McLaughlin draws inspiration from clouds and celebrates the power of the imagination and the importance of friendship.

**i** See the tear off slip overleaf for a chance to win a signed copy of *The Cloudspotter*.

