



Weather

Making a difference for you – today, tomorrow and in the years ahead



Met Office
FitzRoy Road, Exeter,
Devon, EX1 3PB
United Kingdom

Tel: 0870 900 0100
Fax: 0870 900 5050
enquiries@metoffice.gov.uk
www.metoffice.gov.uk

Produced by the Met Office
©Crown copyright 2009 08/0256
Met Office and the Met Office
logo are registered trademarks

Life in a day

Providing the best weather and climate service in the world

Look outside. How's it faring today? Bright sunshine and clear skies? Or torrential rain and howling wind? Unseasonably warm or bitterly cold?

Knowing what the weather's up to now is crucial for daily decisions. And it's vital, too, to know what's likely tomorrow, next week, and in the months, years and decades ahead as our climate changes. This knowledge can make the difference between winning or losing, profit or loss, even life or death.

Around the clock, around the world, millions of people need to know more about how the weather will affect them now and in the future.

Which is where we come in.

As a world-leading weather and climate service, the Met Office works closely with governments, individuals and organisations of every size to share its expert scientific knowledge and advice.

The Met Office has been a pioneer for over 150 years. This brochure invites you to find out more about the depth and diversity of our products and services, over 24 busy hours.





00.13 GMT: Just past midnight and local authority duty-officer Karen Johnson is roused from sleep by an important text. It's the Flood Forecasting Centre in London confirming extreme rainfall in just two hours time.



With surface flooding on the cards and the potential for rivers to burst their banks, Karen logs on to the Met Office website to double-check warnings she's specified for nominated colleagues. All correct. Next, Karen receives a call from the dedicated Met Office Public Weather Service Advisor responsible for helping her authority plan for and handle emergencies of this type.

Karen's late night text is certainly not the first time she's heard about the downpour. It's been hotly tipped for three days in calls and briefings involving the Met Office, Flood Forecasting Centre, Environment Agency, neighbouring local authorities, 'blue light' emergency services and others. Another message: 'a multi-agency teleconference is convened for 00.45'.

Joined-up thinking

Increasingly severe weather caused by climate change has prompted new approaches to the way the Met Office assists in emergencies.

The Flood Forecasting Centre in London is a joint initiative that brings together Environment Agency expertise in hydrology and the Met Office's understanding of weather to increase the speed and consistency of guidance.

Its aim is to provide more advanced notice of when flooding might occur. Coordination also drives the 'Gold Command' management structure in which the Met Office plays a crucial role alongside the police, fire and ambulance services and public bodies, as well as supporting organisations and infrastructure providers.

Single point of contact

Public Weather Service Advisors offer a direct link to Met Office Public Weather Services through a single point of contact. Their role is to help Government

Office regions in England and Wales and the Devolved Administrations stay several steps ahead of the weather — and manage its impact.

If people are to be evacuated, will caravans be safe? How are current plans for road and school closures affected? Are the rest centre locations first identified still secure?

When the weather is exceptionally severe, Met Office involvement goes national through briefings to the Civil Contingencies Secretariat and Cabinet Office Briefing Room (COBR) which may, in turn, lead to requests for local military resources.

Emergencies. All in a day's work for the Met Office as it contributes to the protection of life, property and vital infrastructure.

Find out more at www.metoffice.gov.uk/publicsector

Met Office Public Weather Services include:

- National Severe Weather Warning Service
 - Environmental Monitoring and Response Centre
 - Public Weather Service Advisors
 - Region and location forecasts
 - Mountain forecasts
 - National Meteorological Library and Archive
-

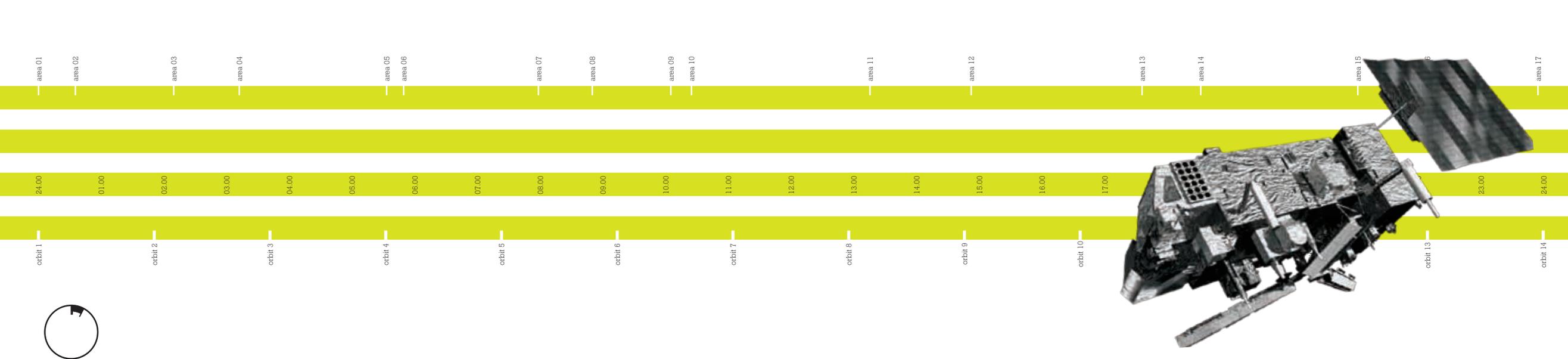


01.53 GMT: MetOp-A, Europe's first polar-orbiting meteorological satellite, is 850 km above the North Atlantic and travelling at 7 kilometres per second.

Making around 14 circuits over the next 24 hours, it will view each part of the Earth at the same local time each day. On its journey it will measure the temperature and humidity of the atmosphere, the wind speed, direction and temperature at the ocean surface, and other quantities important for forecasting the weather and climate. This mountain of data will feed into the Met Office's numerical models — to help forecast the weather for tomorrow and the coming weeks.



'The network of weather stations in the UK and around the world provide us with millions of observations each day'



Eye in the sky

MetOp-A: one link in a network covering land, sea and air

MetOp-A was launched in 2006 — part of a three-satellite programme running to 2020 planned by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), at which the Met Office represents the UK, in collaboration with the European Space Agency and the USA.

EUMETSAT provides weather data for the Met Office and other National Meteorological Services in Europe and around the world.

Big picture

MetOp-A's radiometers are used to measure atmospheric temperature and humidity.

Its imager can render highly detailed information at 1 km resolution — on cloud height and cover, fog, dust storms, volcanic ash, sea-surface temperature, snow cover and vegetation. Other instruments cover ocean-surface wind, soil moisture, sea-ice, ozone, pollution and the greenhouse gases that control the climate.

Satellite data, including those from the complementary technology of high-orbiting geostationary satellites, such as the Meteosat series, are crucial to short- and medium-range weather forecasts.

Down to earth

Satellite data alone, though, are not enough. The Met Office's network of weather stations in the UK and around the world provide us with millions of observations each day. Observations from ocean buoys, weather balloons, ships and aircraft make important contributions to forecasting too.

It's these measurements of temperature, pressure, wind speed and direction, humidity and other properties that also feed into the Met Office models behind a host of vital weather services such as aviation safety.

These 'synoptic' weather observations are supported by voluntary cooperating stations in many locations. An even larger number of dedicated 'rainfall only' and automated stations, plus specialised observatories and facilities, all play their part.

Observational data are the lifeblood of Met Office forecasts. Not only do they tell us what weather systems may be developing, but how the climate is changing.

Find out more at www.metoffice.gov.uk/weather



05.20 GMT: “Gale warnings, Forties, Cromarty, Forth, Tyne, Dogger...”
For Angus McCormack, the lilt of the Shipping Forecast is a lifeline and, occasionally, a lifesaver.

“It’s bitterly cold on deck this morning, the sun is just creeping above the cloud base, and the wind is blustering across the bow. As a trawlerman of 20 years, I can hazard a good guess at what this means for my journey, but there’s only one way to be sure. I duck below deck, put on a brew and click on the radio.

“It’s time for the Shipping Forecast. Broadcast four times a day, it’s the best means of finding out exactly what the conditions are like at sea, so I can plan my trips and plot the safest passage home. Today’s forecast is for a strong southerly wind, veering westerly with moderate visibility and rain for a while, but nothing to alarm the crew.

“I flick off the radio, down the last of my coffee and fire up the engine. With a shout to the boys I haul the steering wheel to the right and set a course back to Peterhead.”

A legend in brief

What exactly is the Shipping Forecast?

The Shipping Forecast is a weather forecast issued by the Met Office on behalf of the Maritime and Coastguard Agency (MCA). It focuses on the seas surrounding the British Isles and is broadcast on BBC Radio 4 at 00:48, 05:20, 12:01 and 17:54 every day.

When did it start?

It was first broadcast on BBC radio in 1925. It is still broadcast on Radio 4, but is now also available online via the Met Office and BBC websites, and transmitted by the MCA’s NAVTEX system.

How does it work?

The forecast covers wind, weather, visibility and, when needed, icing warnings throughout a 24-hour period, while the online and MCA issues also include sea-state descriptions. It covers 31 sea areas ranging from south-east Iceland in the north to Trafalgar, which borders Portugal, in the south and from Rockall in the west to Fisher, bordering Denmark, in the east.

What does it involve?

Met Office marine forecasters compile every script to a strict 380-word limit. Gale warnings are given first, followed by a general synopsis of the weather, before each area forecast is provided.

Who uses it?

Anyone departing from or arriving into British waters can use the Shipping Forecast to find out how the current conditions could affect their time at sea. Accuracy and consistency are paramount, particularly between the Shipping Forecast and gale warnings, where inconsistency could lead to flawed decisions and risked lives.

Find out more at www.metoffice.gov.uk/weather/marine



06.57 GMT:

Leeds office worker Michelle Forbes looks to her radio for weather tips as she prepares for her journey to work... Should she take her broly? Or take the gamble?

Delivery man Savraj Singh checks a smartphone as he climbs into his van for a Swindon day tour. Online weather information helps him take the guesswork out of scheduling the route.

Suffolk farmer Phil Stott pours milk on his daughter's cereal, with Met Office forecaster and BBC broadcast meteorologist Rob McElwee also in full flow on Radio 4's morning bulletin. Will today stay dry enough to plant the bottom field?

Specialist OpenRoad weather services also help keep the nation moving

Using the same high-quality data that drives all Met Office weather forecasts, OpenRoad helps highways agencies and local authorities decide when (or when not) to grit and treat their roads.

- Latest web technology
 - Innovative route-based forecasting
 - One-to-one help from OpenRoad experts and Met Office forecasters
-

And the outlook for later...

Michelle, Savraj and Phil are just some of the millions each day who depend on Met Office weather content via BBC and independent television and radio, and, increasingly, online and mobile platforms.

Serving the BBC's national and international channels, Met Office broadcast meteorologists at the BBC Weather Centre in London produce as many as 90 television forecasts each week day. The BBC Weather Centre also issues over 35 daily bulletins for Radio 4, Radio 1, Radio 2 and Radio Five Live, Heathrow Express and the British Forces Broadcasting Service.

Television and radio bulletins may, mostly, be short on time but are big on challenge as the majority are live, unscripted and in the sole control of the broadcast meteorologist in the studio.

It's his or her job to interpret the latest weather information from the Met Office Operations Centre in Exeter and, along with advice from Met Office chief forecasters and BBC production teams, choose the detail needed throughout the day.

From charts, stills and animations to live weather cameras, state-of-the-art graphics help Met Office

broadcast meteorologists to tell their weather story in an engaging — and often highly entertaining — way.

Expanding horizons

Met Office media technology has benefited from technological advances ever since the first weather bulletin was broadcast on BBC television in 1936.

A new Met Office Media facility at London's Millbank Studios means major broadcasters such as ITV, ITN, GMTV, Channel 4, Scottish Television and others have easy access to fast-evolving multimedia tools and services.

Sophisticated WeatherEye graphics showing 2D and 3D weather information. Dynamic virtual imaging for television, the latest generation mobiles and handhelds. Out-of-home screen networks and more. In fact, 'on demand' video weather forecasting for smartphones was a Met Office world first.

As fast as technology changes, so do the possibilities. Both the BBC Weather Centre and Met Office Media continue to bring weather and climate science ever more interestingly to life.

Find out more at www.metoffice.gov.uk/media





08.52 GMT: Despite the freezing weather, Captain John Rowse taxis to the runway and prepares for his 08.59 take-off.

“It’s thanks to the Met Office’s Aircraft De-icing Forecast Service that I’m here on time today. Two days ago, my operations team received an icing alert which meant it could put the de-icing teams and rigs on standby for this morning’s instruction to de-ice. Being ready for what today’s weather had in store meant they could warm the de-icing rigs bright and early and treat our planes from tip to tail.

“My pre-flight weather briefing tells me there are very strong winds at 34,000 feet, which means a slightly faster flight time to Berlin. Snow showers are forecast for our arrival, so it’s good to know that the operations guys have access to the most up to date weather information.

“It’s bang on 08.59 and I’ve been given final clearance. With a nod to my co-pilot I open the throttle.”



‘Our Aircraft De-icing Forecast Service has been proved to reduce icing delays by 84% and reduce costs by up to 30%’



Come fly with me

For more than 90 years, the Met Office has helped the civil aviation industry take to the skies safely and smoothly. But just what do we offer?

Weather forecasts and warnings

As the World Area Forecast Centre, London, the Met Office is one of only two WAFCs and has been providing upper wind and temperature forecasts for flights all around the world, four times a day, since 1984.

Closer to home, all aircraft using UK airspace — from jumbo jets at Heathrow to hot air balloons at local rallies — need vital weather information from the Met Office to take-off and land quickly and safely.

Aircraft De-icing Forecast Service

The Aircraft De-icing Forecast Service provides weather conditions and icing information up to five days in advance, from at a glance summaries and dewpoint, temperature and weather type graphs, to forecasts showing hold-over times for de-icing fluids. It’s 98% accurate and has been proven to reduce icing delays by 84%, reducing costs by up to 30%.

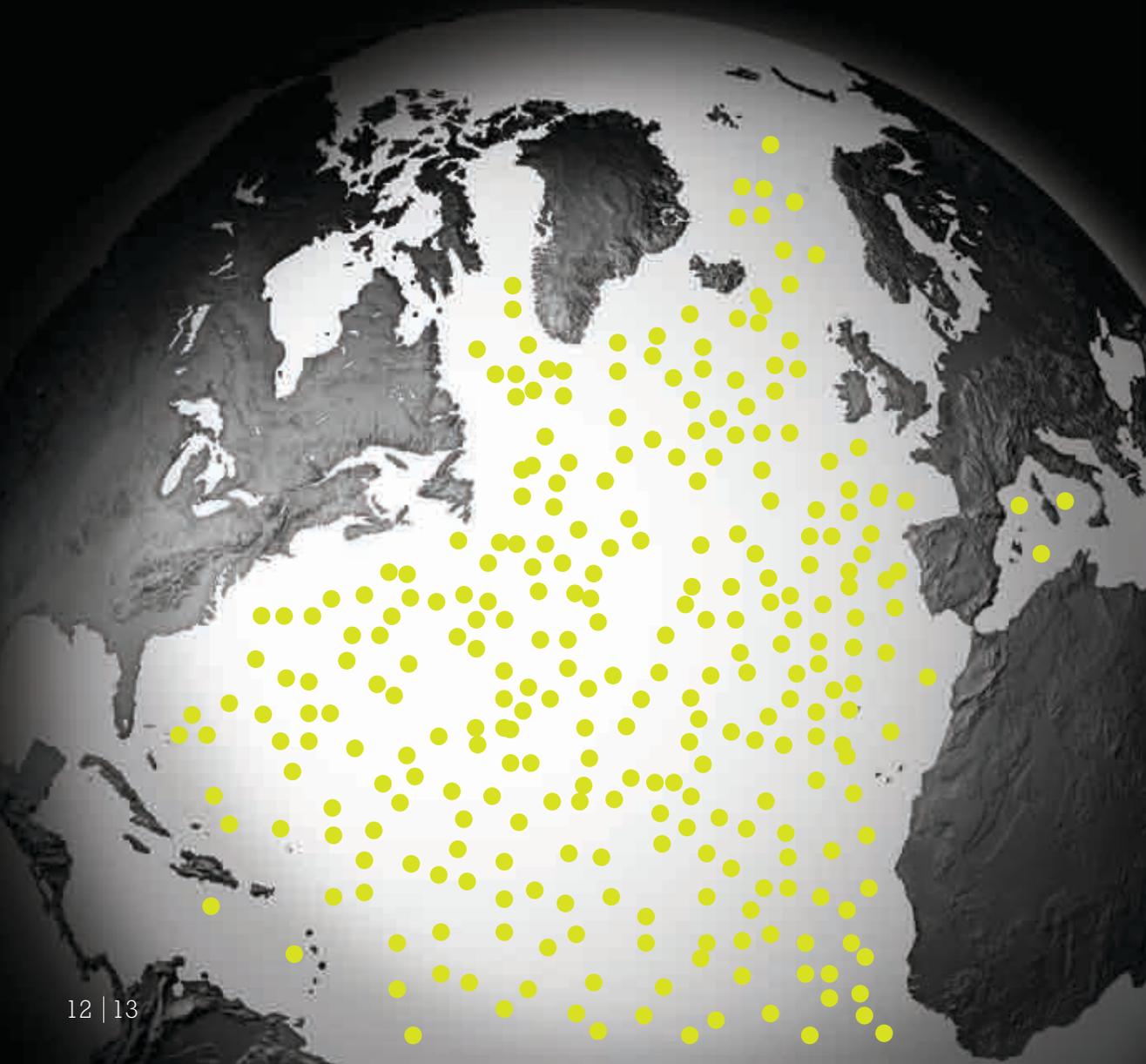
OpenRunway

OpenRunway is a 24-hour forecast service offering information on localised weather conditions at airports, up to five days ahead. It can be accessed online, by email, or direct from one of our aviation forecasters via a telephone briefing. It features hourly summaries of the status of individual runways and airports, forecasts of weather hazards and interactive weather maps.

Find out more at www.metoffice.gov.uk/aviation



10.44 GMT: An Argo float bobs to the surface after its 2,000-metre dive in the north Atlantic. Nearing the end of a ten-day cycle, it transmits its data on ocean temperature, salinity and depth to a satellite.



The float's transmission is picked up by the British Oceanographic Data Centre where the data are processed before being sent to the Met Office and two global Argo data centres, including the Coriolis Data Centre in France. Along with similar data from around 3,000 other floats worldwide, it plays a vital role in monitoring the impacts of climate change.

Combined with information on surface height, surface temperature and sea-ice concentration, data from all 3,000 floats are used to define the current state of the oceans in the global Forecasting Ocean Assimilation Model (FOAM). A short while later, Met Office scientist Sam Smith sets up the model for its daily run to forecast the ocean conditions for the next five days. The same ocean model is used for seasonal forecasts for the months ahead and climate predictions for the years ahead.

As Sam returns to his desk, thousands of miles away the Argo float prepares to dive again, continuing on its deep sea mission to help scientists better understand how our oceans will evolve over the decades to come.

Our underwater friends

Launched in 2000, the international Argo programme is a data collection project which gathers information about the ocean's temperature and salinity from around 3,000 profiling floats.

Working with the National Oceanography Centre, the British Oceanographic Data Centre and the UK Hydrographic Office, the Met Office leads the UK arm of the Argo programme. Since UK Argo was set up in January 2001, it has deployed and monitored over 250 floats across the Atlantic, Indian and Southern Oceans.

Each float is 110 cm high and contains a satellite antenna along with temperature, salinity and pressure sensors and a programmed inflatable bladder so it can rise and dive. On each of its ten-day cycles, the float sinks to 1,000 metres, drifts for around nine days, sinks to 2,000 metres and then surfaces to transmit the data it has gathered.

Vital statistics

Spaced around 300 km apart, the floats have significantly increased the quantity, quality and breadth of observations of the world's oceans offering higher accuracy at greater depth. All the data gathered from the floats are made freely available in real time and, after careful quality control, in delayed mode.

By detailing the changing state of the upper ocean and the patterns of ocean climate over months and years, this information plays a valuable role in helping to improve the Met Office's climate predictions.

Find out more at www.metoffice.gov.uk/weather/marine/observations/gathering_data/argo

Climate change.

We're causing it, so let's tackle it.

Scientists are often asked if they 'believe' in climate change. For those at the Met Office Hadley Centre who have studied climate records, the evidence that human activity is changing our climate is overwhelming.

'Climate change and CO₂ are clearly linked. And, as a major CO₂ producer, humankind is inextricably linked to climate change'

The proof is in the model

Met Office Hadley Centre scientists use a sophisticated computer model to simulate natural factors (e.g. the Sun, volcanic activity) affecting climate change from 1850 to the present — and then compare the model's output against real-life observations.

The experiment shows that, while the model fairly closely follows the pattern of observations in early years, the graph profiles for each then begin to separate.

The model shows clearly that only human activity and the CO₂ it generates can account for the difference.

Slowing the rise in global temperatures must now be a key priority for governments, organisations and individuals worldwide. Only then can we minimise the effects of increasingly severe weather and avoid irreparable damage to the Earth's natural systems.

Find out more at www.metoffice.gov.uk/climatechange

Danger by degrees

What will happen if climate change is left unchecked?:

- +1 °C
Some marine ecosystems suffer irreversible damage
- +2 °C
Irreversible melting of the Greenland ice-sheet
- +3 °C
Significant loss of Amazon rainforest

Met Office Hadley Centre

- World-leading climate change research and services
 - Provides in-depth information and advice for Government and business as they plan to reduce (mitigate) and prepare for the effects of (adapt to) climate change
 - Played a pivotal role in the influential 2006 Stern Report on the Economics of Climate Change
 - Made a significant contribution to the 2007 fourth assessment report from the Intergovernmental Panel on Climate Change
-



12.05 GMT: Looking out over her frosty lawn, Chronic Obstructive Pulmonary Disease (COPD) patient Sue Garfield's phone starts to ring. It's the call she's been waiting for.

"It looks bitter out there today so I was expecting this call. In fact, I've come to rely on Healthy Outlook from the Met Office to get me through the winter, providing the information I need to help me cope with my condition.

"I pick up the receiver. A pleasant voice tells me that the weather over the next two weeks might make it difficult for me to breathe and checks that I've got enough medication.

"I hang up and check the patient pack that I was sent when I registered for the service with my GP. It gives me useful tips on how to deal with the cold. So, taking its advice, I grab an extra jumper, turn my heating up to 21 degrees and make plans for the next couple of weeks. Thanks to Healthy Outlook, I can breathe easily."

"It's for you..."

When it comes to Healthy Outlook®, automated phone calls are just part of the forecasting service.

Developed in consultation with health care professionals, Healthy Outlook® is a trouble-free service from the Met Office. Once a practice is signed up, it receives a twice weekly winter email detailing the risk to COPD patients that week, with an outlook for the following week too.

When the forecast risk rises, registered COPD patients are alerted by telephone and given suggestions on how to cope with their symptoms. Practice staff are advised by email the day before calls are made and informed once the calls are complete.

Feeling the benefit

There are 900,000 diagnosed COPD patients in the UK, and for many thousands of them last winter was a little easier thanks to this service.

But it's not just the patients who benefit. There are 100,000 COPD-related hospital admissions in England and the condition costs the National Health Service around £800 million each year. Healthy Outlook® has been shown to help ease the load significantly by reducing admission rates.

With training for practice staff, clinicians' guidelines and support packs provided for every registered patient, Healthy Outlook® is more than just a phone call. For both patients and hospital trusts it's a lifeline.

Find out more at www.metoffice.gov.uk/health

'Practices that use the Healthy Outlook® service from the Met Office report an average drop in admission rates of 23%'





13.30 GMT: Met Office Hadley Centre consultant Paula Smith addresses a Thames Estuary 2100 (TE2100) project meeting. Any future increase in severe weather will demand changes to London's emergency flood plans.

Paula is sharing her latest contribution to the TE2100 draft report with co-experts from the Environment Agency, Proudman Oceanographic Laboratory and the Centre for Ecology and Hydrology. By combining advanced ten-year forecasts with a water-level computer model she, and her Met Office colleagues, are predicting a likely range of extreme future water levels. While the Thames Barrier is still expected to hold fast against tidal flow and river flood surge, Paula suggests that upstream plans will need adapting — to handle increased water run-off from torrential winter rains.

'As the Government is focusing on the impacts of climate change, so are private companies, including utilities providers'

Sharing our vision

Met Office consultants are helping government and businesses to reduce activities that contribute to climate change — and plan for change when it happens.

The battle against climate change is at the heart of Government strategy and could radically alter the way public service organisations both operate — and cooperate.

One project for the Department for Work and Pensions involved helping ministers understand how climate change could affect services, staff and external suppliers. DWP buildings in Sheffield were shown to be at direct risk already — a flood occurred mid-project. And while numbers claiming cold weather payments might reduce in the milder winters expected as our climate changes, what would be the implications of the Government

needing to fund widespread air-conditioning in hotter summers?

Further afield, consultancy for the Foreign and Commonwealth Office has seen the Met Office advising on the impact on British citizens abroad of severe weather, sea-level rises and drought.

Challenging business

As the Government is focusing on the impacts of climate change on its policy and services so are private companies, including utilities providers, as they plan years and even decades ahead.

In the first collaboration of its kind, 'The Impact of Climate Change on the UK Energy Industry' project brought together 11 UK energy companies with the Met Office to review the specific impacts of climate change on their sector.

Soil modelling by the Met Office pointed to a need for better underground cables for more resilient networks, as the soil in many areas will become warmer and drier, decreasing its natural cooling effect. Studies of the 'urban heat island effect' suggested the need for more robust surface infrastructure, as the higher temperatures in cities put a strain on people, buildings and materials.

Our models also showed that, in future, with higher summer air temperatures, some power stations will be less efficient and may require modification; while others situated on the coast would need to account for rising sea levels in their plans. Meanwhile, many inland power stations would need to put water management plans in place, as they use river water to cool their systems and climate change means there may be less water in the rivers and the temperature of the water will be higher.

Joined-up thinking is also bringing Met Office expertise to the water industry through collaborative organisations such as Water UK and its Flooding Review Group. Individual water providers, too, are working with us to assess climate change impacts to protect their supplies, inform the siting of treatment stations and the design of sewerage pipes and systems.

Met Office climate change consultancy makes for better informed strategic decisions — by the Government and the private companies we depend on.

Find out more at www.metoffice.gov.uk/climatechange



14.41 GMT: Major Simon Philips downloads a five-day Mobile Met Unit report to help plan an Army reconnaissance deep into Afghanistan's Helmand Province. Choosing the right weather window could be his best protection.

"If we're to reach Delta Base by 17:00 tomorrow we'll need all the help we can get. But the heavy dust storms predicted make that particular sector the last place on earth I want to take my convoy. There's a strong case for delaying what's a challenging operation at the best of times. At least until the picture looks clearer. I guess we'll find out more at Mobile Met Unit's HQ briefing this evening."

Weather wise

Mobile Met Unit staff work with the Royal Air Force, the Army and joint operations partners worldwide.

Throughout history the weather has often been the decider for military success or failure. The Mobile Met Unit (MMU) is there not only to ensure the safety of operational staff, but to swing the balance in favour of success where possible too.

Some 80 Met Office observers, forecasters and engineer support-staff make up the MMU — all RAF reserve officers or airmen — with its HQ based in Lincolnshire. Some are deployed to hotspots such as Afghanistan and Iraq where they can establish a 'mini Met Office' and open for business in a matter of hours.

Home from home

Using portable weather displays and information systems, MMU staff aim to deliver the same service to aircrew and ground troops locally that Met Office forecasters provide at RAF and Army bases in the UK.

'MMU staff aim to deliver the same service to aircrew and ground troops locally that Met Office forecasters provide at RAF and Army bases in the UK'

Satellite links to computer models, weather balloons and other local observations all generate data that feed into the MMU's five day, 12- and 24-hour text-based forecasts, and the visual 'time cross-section' reports much loved by military pilots.

Managing risk

With commanders needing to make ever-quicker decisions, new MMU schemes are providing welcome additional support.

'Trafficability' emerged from research by the Centre for Ecology and Hydrology that takes into account past rainfall, soil type and vegetation to answer life and death questions such as, "Can I take my tank across this ground?"

Tactical decision aids, including night-illumination and dust forecast models, are some of the many other MMU projects moving rapidly from the drawing board to the real world.

Find out more at www.metoffice.gov.uk/defence



15.46 GMT: Castle Primary School Science Club and teacher Jean Jordan are involved in a live videoconference with a Met Office scientist. It's provoking vigorous debate on the truth behind some of our most famous weather sayings.

"Where does 'Red sky at night, shepherd's delight' come from," asks Ashley from Year 6, "and what about my mum's favourite, 'Clear moon, frost soon'?"

The man from the Met Office explains that weather forecasters aren't the only people to predict the weather. In the past, when more people lived off the land, they tried to spot patterns and remember them. Many old weather sayings have more than a grain of truth.

As the videoconference draws to a close, the Met Office scientist asks the class who can remember the basic difference between weather and climate. Miss Jordan invites Ashley to answer.

"Climate is what you can expect", says the ten year-old, "and weather is what you get!"



'The high drama of the weather and our fast-changing climate really captures the young imagination'

Learning a lesson

Met Office Education Services make weather and climate engaging at both primary and secondary school level.

Funded by the Department for Children, Schools and Families, Met Office Education Services open the door to a wide range of downloadable teaching materials via our website based on the English National Curriculum.

Alongside videoconferences and visits to the Met Office in Exeter, our factsheets and other learning materials help bring weather and climate change to life.

Teachers can enhance their own lesson plans — or use ours. Word searches and games, along with a good collection of weather facts and case studies, make learning about the weather fun. For hands-on experience of studying the weather, schoolchildren can also find out how to build their own basic weather station.

Hot property

Our 'Interactive Weather Presenting Kit' typifies the Met Office approach to supporting education and is one of the most requested resources we've ever produced. Suitable for students in Key Stages 2–4, the CD offers useful curricular crossover with Geography, ICT and English, as well as links to live data and charts on the Met Office website.

But it's at secondary school when the high drama of the weather and our fast-changing climate really captures the young imagination.

Case studies on major weather events such as the Great Smog of 1952, the Great Storm of 1987, the European heatwave in 2003, the Boscastle floods in 2004 and Hurricane Katrina in 2005 bring a captivating new dimension to schoolchildren's studies.

Find out more at www.metoffice.gov.uk/education



19.29 GMT: Ugandan Met Department forecaster John Bingamu prepares to face the television camera for the first of three severe weather warnings. Violent storms are expected in some of Uganda's most densely populated areas.

"Although the weather this evening is looking pretty dangerous, at least things will run smoothly from a broadcasting angle.

"We're using some recently upgraded software which I, and my colleagues, have been trained to use by the Met Office team through the WMO's Voluntary Cooperation Programme. It's the same package supplied to Met Office independent TV clients back in the UK, so we can now do just as good a job.

"Weather warnings for affected Ugandans really do help save lives. Let's hope these broadcasts will get the message out in good time for people to respond."

Focus on protection

The Voluntary Cooperation Programme (VCP) supports natural disaster preparation and response, while helping local people use meteorology to improve agriculture, transport, and better understand climate change.

It's a complex and vital remit. The programme — managed by the World Meteorological Organization (WMO) — helps to protect people in developing countries through equipment, services and training. Through the VCP, the Met Office also protects the lives and property of local British citizens.

Uganda is just one example of how the Met Office supports National Meteorological Services (NMSs) in Africa, the South Pacific, Indian Ocean and the Caribbean not only to plan for the worst, but communicate with populations and restore life-critical services in the event of a disaster.

With many developing countries at risk of climate change impacts — such as flooding and desertification — the Met Office VCP programme to generate local observational data for weather and long-term climate modelling has never been more critical.



'Uganda is just one example of how the Met Office supports National Meteorological Services in Africa, the South Pacific, Indian Ocean and the Caribbean'

World view

The Unified Model™ sees the Met Office reaching out internationally to share its skills in numerical weather and climate modelling.

The UM™ is different because it's the only system of its kind capable of modelling the atmosphere to provide a weather forecast for tomorrow as well as modelling the atmosphere and oceans to provide a climate prediction for decades to come.

The Met Office works closely with other NMSs, including South Africa, Australia and Norway, that also run the UM™ routinely.

High resolution Limited Area Models (LAMs) such as the Africa LAM, implemented through the VCP, also draw on advanced UM™ technology.

Outputs from the UM™ mean that, with training such as that provided through the World Meteorological Organization to NMSs across Africa, critical forecasts and warnings of severe weather can be given much further ahead.



22.14 GMT: Forecaster Rob Plummer turns to his computer as initial results from the Met Office supercomputer flash up. The outputs will help forecast the weather today and in coming weeks and months, as well as predict climate change years ahead.

One of Europe's most powerful computers is carrying out billions of calculations using observational data from satellites, land-based instruments, ships, buoys and aircraft worldwide.

A process of assimilation first creates a numerical representation of current atmospheric conditions. Small changes to these conditions can lead to very different weather patterns, so it's vital the atmospheric picture is as accurate as possible. Accurate forecasts, though, are not entirely in the hands of technology. Skilled forecasters will filter tonight's outputs, adjusting against observations and interpreting them for correct emphasis.

Multi-tasking

There may be important differences in the way the Met Office Unified Model™ is used in weather forecasting and climate prediction, but the UM™ is unique in that it drives both.

Numerical Weather Prediction (NWP) with the UM™ uses the laws of physics to represent processes in the atmosphere, oceans and land surface.

By establishing what's happening now, the model can predict near and longer term weather. The Met Office can then warn of the risk of severe weather events, as well as help inform governments and businesses how climate change might look deep into the future.

Here and now

'Nowcasting' uses an estimate of speed and direction of movement to forecast variables such as wind, temperature, precipitation and fog over the next few hours. Human forecasters and lower-powered computers enable the Met Office to refresh 'nowcasts' as frequently as every hour.

Medium-term weather forecasting from 1 to 15 days involves a more complex 'ensemble' approach. This allows forecasters to assess the range of possible forecasts brought about by the chaotic nature of the weather.

Looking to the future

Ensemble techniques incorporating oceanic and atmospheric components are now also used to make seasonal forecasts as well as decadal and longer term climate predictions.

In fact, it's the ten-year timeframe that's currently of growing interest to Government and business — driving the science forward rapidly as organisations seek to understand what a warmer climate will mean in real terms on the ground.

Assessing the likelihood of high-impact weather and climate change through multiple ensemble predictions and adjusting variables, the model or both, is especially critical for protecting life and property in high-risk areas.

The Met Office takes a unique approach in using the same Unified Model™ for weather and climate prediction. It relies, not only on ever-larger computers today, but on the highly skilled scientists and forecasters helping us face the weather challenges of tomorrow.

Find out more at www.metoffice.gov.uk/science/creating



Around the clock, all year round, the Met Office helps millions of people and organisations make sense of the weather and our fast-changing climate.

As the science advances and we break new boundaries, our work will continue to make an ever-bigger difference to lives at home, at work, in the UK and around the world.

Visit www.metoffice.gov.uk, email us at enquiries@metoffice.gov.uk or call our 24-hour Customer Centre on 0870 900 0100 to find out how we can make a difference for you.

The people featured in this publication are for illustrative purposes only; but their circumstances, and the Met Office products and services that support them, are authentic.



Printed on FSC certified 100% Recycled paper, using vegetable based inks, 100% power from renewable resources and waterless printing technology. Print production systems registered to ISO 14001 : 2004, ISO 9001 : 2000 and EMAS standards.