FORECASTING UK AND EUROPEAN WINTERS

WEDNESDAY 19 APRIL 2006

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Some sources of European winter predictability – Dr Adam Scaife, Hadley Centre, Met Office adam.scaife- at -metoffice.gov.uk
We discuss winter European climate anomalies in terms of interactions between the Atlantic Ocean, surface climate variability and the stratosphere. The winter forecast issued by the Met Office in summer 2005 used a statistical method based on Atlantic sea surface temperature (SST) and simulations from first principle physical models. SST anomalies in May gave early indications of below average winter temperatures for Europe. Using recently available subsurface ocean data we comment on successes and failures of this statistical forecast method in previous years. We then show that given the observed winter SST anomalies, part of the cold winter signal over Europe can be reproduced in current models. Finally, we show that the stratosphere appears to play an important role in amplifying surface European climate anomalies in winter 2005/2006 and on longer timescales.

Monthly and seasonal predictability of the winter arctic oscillation – Dr Fiona Parton, University College London fap- at -mssl.ucl.ac.uk
The Arctic Oscillation (AO) is the leading mode of winter climate variability for the extratropical Northern Hemisphere. The AO has strong and stable links to UK and European winter climate and climate extremes (wind speed and temperature) on multi-day, monthly and seasonal time scales. AO forecast precision can thus benefit skilful predictions of European winter weather. The UCL Climate Extremes group have developed skillful probabilistic forecasts for the winter seasonal and monthly AO. The physical basis for these models is knowledge of prior zonal winds in the Northern Hemisphere stratosphere and upper troposphere. Robust hind casts for the period 1958/9 to 2005/6 show that the model anticipates correctly the anomaly sign of the winter AO in 68% of years, and the anomaly sign of the month-ahead December, January and February AO in 71%-79% of years. This precision provides skill in predicting winter temperature, wind speed and wind speed extremes over the UK, Scandinavia, Iberia and the Mediterranean. Real-time deterministic and probabilistic forecasts for winter 2005/6 performed well with the winter AO predicted with an error of just 0.1.

Mechanisms and modelling for European winter prediction – Dr Warwick Norton, CGAM, University of Reading w.a.norton- at -reading.ac.uk

The forcing of European climate in years when there are strong Atlantic sea surface temperature anomalies is examined by comparing model simulations with analysis fields. This suggests that Atlantic SST anomalies can force a Rossby wave train which extends from South America, over the Eastern USA, to Europe. The results for early, mid and late winter are compared with the outcomes for this winter. In particular the predictability of temperature for central Europe and rainfall for the Western Atlantic are examined. The possible interference of El Nino/La Nina is briefly discussed.

End to end forecasting for Europe – Dr Mark Rodwell, European Centre for Medium Range Weather Forecasts Mark.Rodwell- at -ecmwf.int

The persistence of European meteorological anomalies is generally weaker in winter than for other seasons. Because of this, European winter climate forecasting relies on our ability to predict the large-scale atmospheric flow. The "North Atlantic Oscillation" (an oscillation in the north-south surface pressure gradient) is the large-scale feature most strongly associated with European winter climate. Statistical analysis suggests that the North Atlantic Oscillation is partly predictable based on a knowledge of sea-surface (or sub-surface) temperatures. Dynamical modelling studies tend to confirm the causal linkage but fail to capture strongly enough the magnitude of the link. To tap such potential sources of predictability, a determined effort is required to identifying deficiencies in model physics and make improvements. Here, we focus on deficiencies in the tropical physics and how these can impact on the extratropical circulation. Tropical forcing is one explanation for the European circulation anomaly in winter 2005/6 although the role of extratropical sea-surface temperature and variability internal to the atmosphere may also have been significant. Whatever the ultimate levels of seasonal predictive skill for Europe (we shouldn't be too optimistic), the utility of seasonal forecasts can be enhanced by tailoring forecast products to the users' requirements. While we develop the science, it is worth considering who the potential users of such forecasts may be and what the potential value of a forecast is to them. Interestingly, the 'insured loss' associated with a weather event is (almost) precisely not what should be used to quantify this value.

The Met Office winter forecast for 2005/06 – Dr Chris Gordon, Hadley Centre, Met Office

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In September 2005 the Met Office issued a public forecast for the coming winter suggesting it would be colder than average across much of Europe. Statistical and dynamical forecast methods, as well as the analysis of sub-surface ocean conditions in the North Atlantic, were used in producing and monitoring the forecast. The statistical method showed a clear signal for negative North Atlantic Oscillation (NAO) conditions during the winter. Such a signal is associated with colder and drier conditions over much of Europe. The NAO method uses a particular'tripole' pattern of North Atlantic sea surface temperatures (SSTs) as a predictor. The Met Office dynamical model, which shows relatively low skill in winter for surface temperature and precipitation over European land, does show some skill in predicting North Atlantic SSTs. The dynamical model also developed the wintertime North Atlantic SST tripole pattern and, to some extent, an associated negative NAO response. Finally, real-time analysis of sub-surface

ocean temperature observations clearly pointed to the maintenance of the SST forcing pattern into the winter. This talk will describe these various methods, along with some hindcast skill assessments, and discuss how this information was combined to produce the forecast. Lessons learnt for the future will also be discussed.

Communicating the winter forecast – Prof Paul Hardaker, Met Office paul.hardaker- at -metoffice.gov.uk
On 26 September the Met Office issued its first operational long-range 'cold winter' forecast, prepared through a combination of statistical and dynamical models. The forecast models were predicting a two-thirds probability of a colder and dryer than average winter in Europe, which was also likely to impact the UK and in particular the South of England. The forecast was communicated to a range of stakeholder groups forecast including Government, industry and the public. The purpose of communicating the forecast was to enable groups to prepare for the coming winter period rather than just to disseminate an operational forecast. In enabling others to take action it is important that the delivery of the forecast includes context for those using the information, acknowledges the uncertainty within the information and is followed up by support from those producing the forecast. The way key in which the winter forecast was communicated was as important as the information contained within the forecast.

A financial market perspective: the role of probabilistic forecasts in winter trading decisions - Dr Isla Gilmour, Merrill Lynch isla_gilmour- at -ml.com
Financial markets react to forecasts and to publication of 'expert' viewpoints. In energy and weather derivatives markets, weather is a key driver - especially during the winter months. While accurate forecasts are valuable, knowledge about expected consistency between model runs and a good understanding of the uncertainty in forecasts is important. After briefly outlining how weather impacts a given energy market, I will look at the impacts of various forecasts over the winter and highlight the role of probabilistic forecasts in trading decisions over the winter.