

# Argo data and the 'cold winter' forecast for Europe for 2005/06

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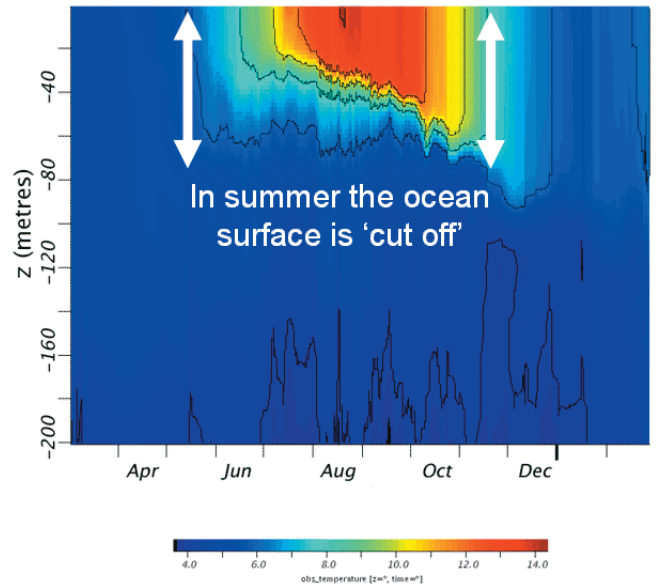
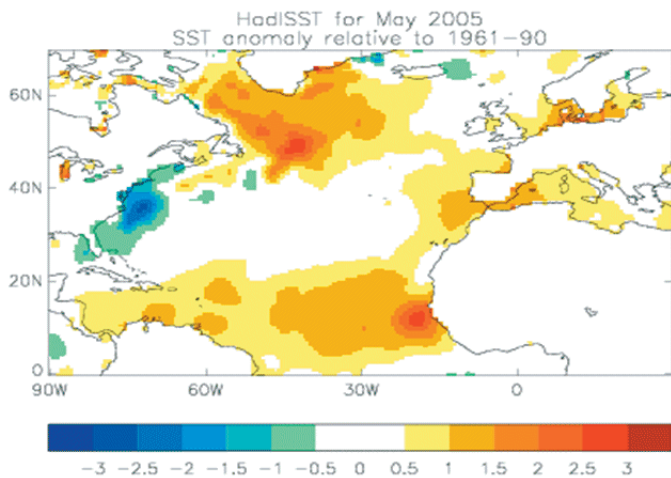
In September 2005 the Met Office issued a long-range forecast for the winter of 2005/06 of a "two in three chance of a colder-than-average winter for much of Europe, and that if Europe were to experience below-average temperatures, parts of the UK - especially southern regions - would also be affected". There was also an indication for a drier-than-average winter over much of the UK.

The forecast was produced using a combination of statistical models and complex climate models with interpretation by operational forecasters. In particular Argo and other sub-surface data were used to examine temperature anomalies in the North Atlantic during 2005 by looking for the likelihood of re-emergence in the autumn of the spring anomaly pattern which would indicate a negative North Atlantic Oscillation mode during the 2005/06 winter. (A negative NAO is often associated with a colder and drier winter across northern Europe). The sub-surface data suggested that the spring anomaly pattern was indeed still present in the sub-surface and likely to re-emerge once autumn mixing eroded the near surface warm layer (see figure), and so provided

further support for the long-range forecast issued in September.

This 'cold winter' forecast attracted significant interest in the UK with briefings to key Government departments, energy companies, health authorities, road and rail authorities, the media and the public. Preparing for cold weather can take several months and groups dealing with contingencies and long-term planning were able to use the forecast to best prepare for whatever the winter was to throw at them.

Following the 2005/06 winter it can be seen that Europe did experience below-average temperatures over a wide area through the winter 2005/6. The winter was very dry across the whole of the UK, warmer-than-average in the north, colder-than-average in the south. In the original forecast there were five main issues that have been verified and in four of these five cases, the predicted most likely event happened.



Left, SST anomaly pattern in May 2005 indicative of a positive NAO mode; right, temperature cross section for a specific location (60W, 20N) showing how the near surface warm layer develops during the summer and erodes in autumn. During the summer/early autumn the underlying temperature anomaly pattern can only be seen in the sub-surface.

WINTER REVIEW		
	PREDICTION	OUTCOME
Mean temperature across Europe	Most likely colder than average	Colder than average for many areas
UK mean temperature	Most likely colder than average	Warmer than average
Southern UK mean temperature	Most likely colder than average	Colder than average
UK precipitation	Most likely drier than average	Drier than average
Northy Atlantic Oscillation (NAO) for winter season	Negative	Negative

Without information from Argo on the structure of the sub-surface temperature anomalies it is unlikely that such a clear forecast could have been made on this occasion. However, it should be borne in mind that not all winters will have a strong signal one way or the other, and in these cases it will always be difficult to provide definitive forecasts.

For further information about seasonal forecasting at the Met Office see <http://www.metoffice.gov.uk/research/seasonal/>