Initialised predictions of the rapid warming of the North Atlantic in the mid 1990s

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In the mid 1990s the North Atlantic underwent a significant warming. The warming was especially clear in the subpolar gyre of the North Atlantic, which underwent an abrupt warming following the winter of 1995/1996. Experiments have shown that the ocean heat transport, largely driven by a strengthening of the Atlantic Meridional Overturning Circulation (AMOC), played a significant role in the warming. The AMOC reacted to the positive North Atlantic Oscillation (NAO) forcing in the late 1980s and early 1990s. The importance of this atmospheric forcing prior to the warming suggests that the warming could have been predictable in advance. To understand the predictability of this event we examine hindcast predictions made with the UK Met Office's decadal prediction system (DePreSys). Initial analysis of the hindcasts suggests that DePreSys has remarkable skill, successfully predicting the warming years in advance. However, hindcasts initialised some years before the event tend to warm too early. Further investigations have provided insight into the causes of these successes and failures. The initialisation of a strong AMOC, and hence strong northward heat transport, was key to achieving successful predictions of the event using DePreSys. However, other aspects of the initialisation have also been shown to have an important influence. The important factors will be presented.