Revisiting the North Atlantic Oscillation

Rodwell *et al.*[1] use an atmospheric general circulation model to show that sea surface temperature (SST) anomalies have driven some of the variations in the wintertime North Atlantic Oscillation (NAO) observed over the past 50 years. They reduce internal atmospheric "noise" by taking the mean of an ensemble of simulations (with each individual simulation driven by the observed evolution of SST), to leave mainly the variations driven by SST changes. While undoubtedly an extremely important result, its significance is likely to be misinterpreted due to the incorrect scaling applied to the ensemble mean results shown in the top panel of their Figure 1.

If the NAO indices from the six individual ensemble members were overlain onto their Figure 1, then the ensemble mean (as shown) would not lie in the centre of the ensemble range – indeed, for some years, it would lie *outside* the ensemble range. This is because they have scaled up the ensemble mean curve so that its variance matches the variance of the observed NAO index. This is not the correct way to use an ensemble, since the ensemble mean *should* have a lower variance than that observed because the noise due to internal atmospheric variations has been partly removed. Results from the six individual members should have been scaled to match the observed variance, and then averaged to produce the ensemble mean.

Rodwell *et al.*'s Figure 1 implies that, according to their model, all of the observed trend in the winter NAO index from the 1960s to the 1990s can be explained by the SST variations over that period. If the ensemble mean curve had been correctly scaled, it would show that only about half of this recent observed trend is explained. Their results, as they were presented, might incorrectly discourage further research into the causes and implications of this major variation in the climate system, on the basis that it had been fully explained.

Timothy J. Osborn
Climatic Research Unit, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK.
e-mail: t.osborn@uea.ac.uk

1. Rodwell, M.J., Rowell D.P. & Folland, C.K. *Nature* **398**, 320-323 (1999).

THIS SHORT NOTE WAS ORIGINALLY SUBMITTED AS SCIENTIFIC CORRESPONDENCE TO NATURE IN 1999. THEY DECLINED NOT TO PUBLISH IT BECAUSE THE EDITOR FELT THAT IT WAS OF LIMITED INTEREST, NOT BECAUSE IT WAS IN ANY WAY FLAWED. COLLEAGUES IN THE SAME RESEARCH FIELD HAVE EXPRESSED THEIR INTEREST IN THIS NOTE, SO I HAVE DECIDED TO MAKE IT AVAILABLE ON MY WEBSITE. IT CAN BE CITED AS:

Osborn TJ (1999) Revisiting the North Atlantic Oscillation.
[http://www.cru.uea.ac.uk/~timo/papepages/osborn1999/osborn1999.pdf]
