



Can we detect a forced trend in the Atlantic meridional overturning circulation?

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The Atlantic meridional overturning circulation (AMOC) at 26.5°N weakened by -0.53 Sv/yr between April 2004 and October 2012. To assess whether this trend is inconsistent with the expected 'noise' in the climate system, we compare the observed trend with estimates of internal variability derived from 14 control simulations from the Climate Model Intercomparison Project 5 (CMIP5). An initial comparison reveals that the observed trend is extremely unusual (or out of range) in most models; however, all 14 models underestimate AMOC variability on interannual time scales. To account for this bias, we scale model estimates of internal variability such that variances on interannual time scales are in agreement with observations. Following this adjustment to variances, the probability of the observed AMOC trend occurring due to internal variability is greater than 1% for all models. For this reason, we conclude that the observed AMOC trend is not significantly ($p = 0.01$) different from that expected due to internal variability.