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## Weak ENSO teleconnections contribute to the signal-to-noise paradox

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Operational seasonal forecasts demonstrate an increasingly useful level of skill in predicting extratropical winter climate. However, particularly in and around the Atlantic basin, atmospheric circulation features such as the North Atlantic Oscillation (NAO) exhibit a phenomenon known as the 'signal-to-noise paradox'; where the ensemble mean correlates more strongly (on average) with observations than individual ensemble members. The paradox may be caused by overestimation of unpredictable internal noise, or by underestimation of the strength of predictable signals. The predictable component of extratropical winter climate is strongly influenced by tropical drivers such as the El Niño-Southern Oscillation. Modelled teleconnections have errors in their phase and amplitude – either or both of which could contribute to the signal-to-noise paradox in the NAO index. We find that the amplitude of the tropospheric ENSO-North Atlantic teleconnection is weaker in the Met Office GloSea5 forecasting system than in observations. This leads to a smaller predictable signal and may therefore contribute to the signal-to-noise paradox. A method of amplitude correction is applied to GloSea5 hindcast data and reduces the signal-to-noise problem for geopotential height predictions in the North Atlantic and North Pacific. A similar method to correct phase errors has little effect.