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Correction of GCM seasonal forecasts using the leading forced SVD patterns

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In a series of seasonal forecasts with two global atmospheric models, the atmospheric response to the specified sea surface temperature (SST) anomalies is found to be model dependent, not only in its amplitude but also in its spatial structure. The forced variability contains the information that may be useful for seasonal predictions at sufficiently long lead times. An SVD analysis is used for each model's ensemble mean forecast 500 mb geopotential height over the Northern Hemisphere and the corresponding tropical Pacific SST. The leading SVD patterns represent the dominant forced patterns associated with the tropical Pacific SST anomalies in the particular GCM, which may or may not match the forced patterns in the real atmosphere. A statistical approach to correct the ensemble forecasts is formulated based on the regression of the model's leading forced SVD patterns and the observed 500 mb geopotential height. This technique is applied to the winter forecasts from the two models. The principal components (PCs) of three leading atmospheric patterns of the SVD analysis are used in the regression equation. The performance of the corrected forecasts is assessed by comparing its cross-validated skill with that of the original GCM ensemble mean forecasts. We are particularly interested in the forecast skill of the two major atmospheric patterns, i.e., the Pacific/North American (PNA) pattern and the North Atlantic Oscillation (NAO). In the case of the PNA, the technique significantly improves the skill of the less skillful of the two models, and does not modify significantly that of the other model, which produces very good PNA forecasts even before the correction. For the NAO, the correction significantly improves the skill of both models.