Improving CFS seasonal prediction.

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For a fixed lead time, one can show that larger ensembles do lead to improved forecasts. In a seasonal prediction setting, a natural inclination would be to increase the ensemble size by including longer model runs, but then two competing effects take place: a positive influence of larger ensemble size on the forecast skill and a negative influence of forecast degradation due to longer lead times. Which one wins depends on lots of factors. Monthly CFS seasonal forecasts for 1981-2006 have been studied, each forecast is based on a 15-member ensemble run for 9 months. A procedure presented here counters the negative influence of longer lead forecasts by carefully selecting a subset of lagged ensemble to create a larger ensemble and to gain an improvement in forecast skill. This approach is low-cost, since the training of the lagged members does not carry a significant computational burden, so the only additional expense is to run 5 or 10 (we tested several possibilities) ensemble members for 2 or 3 months. The improvement gained with the specially selected members is statistically tested by comparing it with the PDF of forecasts using randomly selected lagged members to confirm that the proposed choice of the additional ensemble members indeed makes the forecast better in the probabilistic sense throughout the evaluation period.