Ensemble Predictions of Seasonal Variability with a Coupled Ocean-Atmosphere Model

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The skill of seasonal ensemble prediction with an intermediate complexity coupled ocean-atmosphere model is examined in hindcast simulations during the period 1980 to 2000. The coupled model consists of a global atmospheric model coupled to a Pacific basin ocean model. An ensemble prediction scheme based on perturbations that grow fast over a period of a month is used to generate the perturbations to the analyses; the analyses are obtained by nudging the ocean fields towards observations. The perturbations contain coupled modes with ocean temperature fields that peak in the equatorial regions and atmospheric fields characterized by large scale teleconnection patterns. Comparisons have been made between the skill of ensemble mean forecasts with the skill of control forecasts in 12 month hindcasts started each month for the period 1980 to 2000. We have examined how ensemble skill depends on the number, type and amplitude of ensemble perturbations. We have also examined how skill depends on the annual and ENSO cycles. In general the seasonal ensemble scheme results in ensemble mean forecasts that are significantly more skilful than the control forecasts as well as providing error estimates of the forecasts.