



## **Ensemble generation using breeding for seasonal and inter-annual forecasts**

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Most commonly, lagged initial conditions are chosen to initialize models for seasonal and inter-annual forecasting, but whether or not this can be improved upon remains an open question. An alternative method is a technique called Breeding, which was originally developed in the context of weather forecasting. Essentially, breeding works by computing the difference between a control run and a perturbed run, which is then normalized and used as a perturbation for the next initialization. After this continues for a few cycles, the perturbations begin to resemble the fastest growing error modes of the model, with the desired result that ensemble spread can be increased, especially at short lead times. We apply the technique of breeding to the oceanic component of a global coupled climate model (ECHAM/MPIOM), and compare this to ensembles generated with lagged initial conditions. Our conclusions are based on indicators commonly used to estimate ensemble quality, including spread skill scores and rank histograms. Initial results indicate that the breeding technique shows some promise towards improving seasonal and inter-annual forecasts, especially at lead times up to one year.