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The Multi-Ensemble Approach: the NAEFS Example

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The North American ensemble Forecasting System is the combination of two Ensemble Prediction Systems (EPS) coming from operational centers: Canadian Meteorological Centre (CMC) and National Centers for Environmental Prediction (NCEP). This system provides forecasts of up to two weeks and should improve the predictability skill of the probabilistic system, especially for the second week.

First, a comparison between the two components of the NAEFS is performed for several atmospheric variables with 'objective' verification tools developed at CMC (CRPS and reliability-resolution decomposition, reduced centered random variable, and confidence interval estimated by bootstrap methods). One observes that CMC system is more reliable, especially due to a better ensemble dispersion, while NCEP system has better probabilistic resolution. The NAEFS, compared to CMC and NCEP EPSs, shows significant improvements both in term of reliability and resolution. The predictabililty has been improved by one to two days in the second week. That improvement is not only due to the increased ensemble size in the EPS -from 20 members to 40 in the present case-, but also to the combination of different models and initial condition perturbations. By randomly mixing members from CMC and NCEP systems in a 20-members EPS, an intrinsic skill improvement of the system is observed.