Improvements of seasonal weather forecasts using optimal combination of multimodel hydrodynamical forecasts

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The main objective of the present study is to improve seasonal weather forecasting applying statistical analysis to hydrodynamical model outputs from Russian and foreign GCM models. Quantitative estimates of the ability of the models to reproduce the temporal and spatial variability of the meteorological fields were obtained. Reasonable skill scores of forecasts have been observed over tropical zones, while the forecast assessments were low over North Eurasian region. Although performance of basic methods of complexation demonstrated advantage of the multimodel forecast over individual forecasts constituting the ensemble, the prognostic ability of complexated forecast is still not enough high in high latitudes regions. In attempt to increase the predictability, a new statistical approach based on "predictant-predictors" system was elaborated. H-500 data from model set were used as predictors, and T850 – as a predictant. Correlation analysis between the local 850 and the global H-500 from different models was appplyed to identify informative geographical regions of H-500 for each model. Compact representation of the H-500 predictor data was done using EOF analysis. Two best-predictor models from extended predictor dataset were identified at concrete prognostic season after applying stepwise multiple regression procedure. Evaluation of the statistical approach on dependent and cross-valiadated datasets demonstrates high skill score for dependent and cross-validated datasets. However the method has some deficiencies related with instability of found equations and needs more test experiments. Preliminary results of this study figure out that adaptive statistical methods for optimal complexation of hydrodynamical models can be useful tool to improve long-range forecasts.