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Study of aridification in the Inner Mongolia with the conditional nonlinear optimal parameter perturbation method

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Using the extension of CNOP-P method, we study the parameter optimization of CoLM with DE method to the Hulunbeier Steppe in this paper. Experiment I with NCEP/DOE AMIP-II 6-hourly Reanalysis Gaussian Grid data and experiment II with NMC Reanalysis 6-hourly surface fluxes data are designed to study the impact of the percentages of sand and clay of the shallow soil in CoLM on the ability to simulate the shallow soil moisture. The optimal parameters obtained by the extended CNOP-P method are used to predict the shallow soil moisture in the following one month. The results display that the optimal parameters make the simulating ability of CoLM to the shallow soil moisture better, and the optimal parameters attained by the double-parameter optimal experiment could make CoLM simulate the shallow soil moisture the best in the optimization slot. The optimal parameters could significantly improve the prediction results of CoLM at the stage of prediction. Moreover, the more accurate the atmospheric forcing data and observation data are, the more significant the results of optimization will be.