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The extended application of the conditional nonlinear optimal parameter perturbation method in the Common Land Model

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In our study, CNOP-P method is extended and applied to the parameter optimization of CoLM with DE method. Experiment [U+2160] and Experiment [U+2161] are designed to investigate the impact of the percentage of sand and clay in the shallow soil in CoLM on the ability of simulating the shallow soil moisture, with NMC Reanalysis 6-hourly surface fluxes data and NCEP/DOE AMIP-[U+2161] 6-hourly Reanalysis Gaussian Grid data at NCEP/NCAR Center. The percentage of sand and clay in the shallow soil after the stage of optimization are used to predict the shallow soil moisture in the later month. The results show that the optimal parameters can make CoLM simulate the shallow soil moisture better, the simulation results of CoLM after two-parameter optimal experiment are better than one -parameter optimization, and the optimal parameters could improve the prediction results of CoLM in a significant way at the stage of prediction. In addition, whether the atmospheric forcing data and observation data are accurate can seriously affect the results of optimization, and the more accurate the data are, the more significant the results of optimization will be.