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An evaluation of parametric sensitivities of different climatic variables simulated by the Earth System Model of Intermediate Complexity LOVECLIM

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Earth System Models (ESMs) are an important tool for understanding past climate evolution and for predicting future climate change. However, the ESM model outputs contain significant uncertainties. A major source of uncertainties is from the specification of model parameters. Specification of ESM model parameters is complicated as most ESMs contain a large number of model parameters. Further, ESMs simulate many different climatic variables and are computationally expensive to run. In this study, we intend to use a design of experiment approach to evaluate the parametric sensitivities of different climatic variables simulated by LOVECLIM, an Earth System Model of Intermediate Complexity (EMIC). Three sensitivity analysis methods are used to explore the sensitivities of different outputs of LOVECLIM, such as global mean temperature, global land/ocean precipitation and evaporation to different model parameters. A newly developed software package, Uncertainty Quantification Python Laboratory (UQ-PyL), is employed to execute the sensitivity analysis. A total of 23 adjustable parameters of the model were considered. This presentation will present the preliminary results of parameter sensitivity analysis, which, in turn, should form the basis for further optimization of the model parameters to better simulate the climate system.