# What defines climate model performance and skill?

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Model evaluation in numerical climate research is a controversial issue: Current and historical observational data are both used as a means of determining model parameters and as a test bed for model performance. When equilibrium values of physical observables sensitively depend on model parameters, their predictive significance is compromised.

In the past, such variables as mean temperature and precipitation or their fluctuations have been suggested as indicators of model *skill*. When models are compared to observations, it is however not clear in general, how to distinguish true model performance from artificial skill due to tuning of parameters. In this process, model errors may compensate one another to yield seemingly correct results without adequately representing the underlying physical processes. We analyse these shortcomings by comparing different model metrics and propose a more structured route to an objective judgement on model performance and their capacity to predict the future climate. We apply our methods to regional model results over Europe, such as the Ensembles data set.