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Application of Predictive Model Selection to Coupled Models

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A predictive Bayesian model selection approach is presented to discriminate coupled models used to predict an unobserved quantity of interest (QoI). The need for accurate predictions arises in a variety of critical applications such as climate, aerospace and defense. A model problem is introduced to study the prediction yielded by the coupling of two physics/sub-components. For each single physics domain, a set of model classes and a set of sensor observations are available. A goal-oriented algorithm using a predictive approach to Bayesian model selection is then used to select the combination of single physics models that best predict the QoI. It is shown that the best coupled model for prediction is the one that provides the most robust predictive distribution for the QoI.

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