

**Identification of outliers in multi-model climate simulations**Emerson LaJoie<sup>†</sup>; Timothy DelSole<sup>†</sup> George Mason University and COLA, USALeading author: [elajoie@gmu.edu](mailto:elajoie@gmu.edu)

An outstanding problem with analyzing climate simulations from multiple models is whether some of the models should be removed before pooling their simulations. Unfortunately, it is difficult to justify dropping a specific model without knowing the analysis that will be applied to the multi-model data set. We propose an objective, statistical method for identifying "outliers" among a set of climate simulations, in the sense that the identified model has statistical characteristics that are extremely unlikely relative to the other models. We argue that if a small number of models are extremely different from other models, then it would not be appropriate to pool these models with the others, regardless of the subsequent analysis. Applying this new method to the CMIP3 control simulations reveals certain models to have temperature variations that are extremely unlikely relative to the other models. Moreover, the spatial structure of these outliers is remarkably distinctive, and hence may be instructive to model developers. Moreover, the spatial structure tends to repeat nearly exactly in certain months, suggesting that the classification is robust (not sensitive to sampling variability). We suggest that the method is very attractive because it provides the basis for dropping certain models from a multi-model pool in a way that can be justified independently of the specific application to which the multi-model data set is applied.