

ENSEMBLE DESIGN TO SUPPORT SOCIETAL TRANSFORMATION

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Earth System Models (ESMs) are widely used to make projections of future climate under anthropogenic climate change and to study the likelihood and consequences of crossing tipping points in the earth system. Despite being our most complex modelling tools, however, these models are significantly and substantially different to reality so it is important to question how we should interpret their results and how we should use them to obtain the most robust information currently possible. This is important if we are to rapidly progress our scientific understanding but it is also a matter of urgency to use them effectively because their outputs are widely used to justify and motivate climate policies.

Here I will discuss epistemic issues in the interpretation of multi-model and perturbed-physics ensembles. Building on these foundations I will present an approach to the design of such ensembles which enables them to focus on exploring as broadly as possible the societal consequences of crossing tipping points. I will further argue that such designs provide a new line of evidence about tipping point risks; one that is conceptually different to traditional approaches to model interpretation and shifts the question from “when is a model good enough” to “when is a model too bad to be considered relevant”.