



Understanding ocean parameter choices to improve climate projections over Europe

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Previous work has shown that climate models in CMIP5 can display a variety of magnitudes of forced and unforced variability (estimated from control and transiently forced simulations). Many centres now use common components for models, such as the NEMO ocean model, but different parameter choices and components of the coupled model (e.g. atmosphere model) result in strikingly different results. Here, we will directly investigate these differing model behaviours to determine which aspects of the variability are robust between models and which aspects are sensitive to specifics of the model formulation. This will be achieved by examining in detail two state-of-the-art CMIP6 climate models from European centres that use a common ocean configuration (“shaconemo”) but different atmosphere sub-models: HadGEM3-GC3.1 (Met Office Hadley Centre, UK) and IPSL-CM6 (IPSL, France). Our objectives are to understand and document the annual/decadal variability in two state-of-the-art numerical models of our climate using a joint approach to understand the key uncertainties and subsequently perform experiments with these models to explore and quantify the numerical/parameter origins of these uncertainties, their robustness, and ascertain which parameters/processes should be the focus of further study and/or observational campaigns. Eventually, the results of such analyses may enable us to understand the detail of CMIP6 multimodel projections/predictions over Europe and how to narrow the associated uncertainty ranges.