

## **Inter- to multidecadal variability in a hierarchy of MPI-ESM model set-ups**

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The quality of decadal climate predictions rests fundamentally on the ability of the climate models to reproduce the observed climate and its variability. Previous studies have shown that the simulated decadal to centennial variability is not only model-dependent, but also depends on model resolution, complexity, and the parameterization of certain processes. Here we use the Max Planck Institute Earth System Model in a variety of resolutions both in the atmosphere and the ocean. We investigate important internal variability features, such as the Atlantic Multidecadal Variability in both unforced control simulations and in experiments with natural and anthropogenic external forcing. We identify the characteristics of the variability, the underlying mechanisms and their dependence on the model settings. In particular, we investigate the role of vertical resolution in the atmosphere and the representation of the stratosphere and the role of horizontal resolution in the ocean for signal propagation.