



## **How are interannual modes of variability IOD, ENSO, SAM, AMO excited by natural and anthropogenic forcing?**

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Natural climate variability is found in observations, paleo-proxies, and climate models. Such climate variability can be intrinsic internal variability or externally forced, for example by changes in greenhouse gases or large volcanic eruptions. There are still questions concerning how external forcing, both natural (e.g., volcanic eruptions and solar variability) and anthropogenic (e.g., greenhouse gases and ozone) may excite both interannual modes of variability in the climate system. This project aims to address some of these problems, utilising the large ensemble of the MPI-ESM-LR climate model.

In this study we investigate the statistics of four modes of interannual variability, namely the North Atlantic Oscillation (NAO), the Indian Ocean Dipole (IOD), the Southern Annular Mode (SAM) and the El Niño Southern Oscillation (ENSO). Using the 100-member ensemble of MPI-ESM-LR the statistical properties of these modes (amplitude and standard deviation) can be assessed over time. Here we compare the properties in the pre-industrial control run, historical run and future scenarios (RCP4.5, RCP2.6) and present preliminary results.