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An evaluation of modelling 20th century climate variability in CMIP5 models

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A crucial performance test of Earth system models is their ability to simulate the climate mean state and variability. This study concentrates on representation of inter-annual to multi-decadal variability in 12 CMIP5 climate model simulations. Reference climate is provided by two 20th century reanalysis data sets of monthly mean near-surface air temperature. The spectral decomposition is based on Randomised Multi-Channel Singular Spectrum Analysis (RMSSA). The total spectra of the two reanalysis data sets are similar in all time scales, except some differences on the decadal scale (10–30 yr). None of the 12 coupled climate models closely reproduce all aspects of the reference spectra, although some models represent many aspects well.