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Assessment of mid-latitude atmospheric variability in CMIP5 models using a process oriented-metric

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We compare, for the period 1962-2000, an estimate of the northern hemisphere mid-latitude winter atmospheric variability according several global climate models included in the fifth phase of the Climate Model Intercomparison Project (CMIP5) with the results of the models belonging to the previous CMIP3 and with the NCEP-NCAR reanalysis.
We use the space-time Hayashi spectra of the 500hPa geopotential height fields to characterize the variability of atmospheric circulation regimes and we introduce an ad hoc integral measure of the variability observed in the Northern Hemisphere on different spectral sub-domains.

The overall performance of each model is evaluated by considering the total wave variability as a global scalar measure of the statistical properties of different types of atmospheric disturbances.

The variability associated to eastward propagating baroclinic waves and to planetary waves is instead used to describe the performance of each model in terms of specific physical processes.

We find that the two model ensembles (CMIP3 and CMIP5) do not show substantial differences in the description of northern hemisphere winter mid-latitude atmospheric variability, although some CMIP5 models display performances superior to their previous versions implemented in CMIP3.

Preliminary results for the 21th century RCP 4.5 scenario will be also discussed for the CMIP5 models.