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Title: Extra-tropical flow regimes and connections with tropical rainfall in the MINERVA experiments

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Abstract:

An analysis of flow-regimes in the Atlantic and Pacific sectors of the northern extratropics is used as a basis for the assessment of sub-seasonal variability and predictability in the coupled ensemble re-forecasts run under the MINERVA project (a COLA-ECMWF collaborative study supported by NCAR Accelerated Scientific Discovery program).

Flow regimes are identified from a cluster analysis of 5-day mean fields of geopotential height from 34 winter seasons covered by the ERA-Interim re-analysis. It is shown that preferred combinations of Pacific and Atlantic regimes can be associated with recurrent hemispheric scale patterns (such as the COWL), and their frequencies are affected by tropical-extratropical interactions.

The MINERVA experiments consist of ensembles run with the ECMWF coupled model using different atmospheric resolutions (64, 32 and 16 km in the horizontal). For the lower and intermediate resolution, the re-forecasts cover 31 years, with start dates in May and November. In this study, data for the first 3 forecast months from November start dates will be used; in this range, 51-member ensembles are available for each year.

The study addresses two main topics, comparing results obtained at two different resolutions:

- 1) Are the frequencies of different flow regimes, and the dominant connections between Pacific and Atlantic regimes, correctly simulated by the coupled model?
- 2) Are the teleconnections between tropical rainfall anomalies and regime frequencies reproduced on sub-seasonal and seasonal scale, and how are they reflected in measures of regime predictability?

In the future, the methodology used in this study will be applied to the validation of the ECMWF operational sub-seasonal forecasts and re-forecasts, including the ECMWF contributions to the S2S database.

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