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# Response of the Mean Meridional Circulation to El-Niño/La-Niña in the ERA-20CM Experiment Simulations

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The El-Niño Southern Oscillation (ENSO) is the predominant interannual variability mode in the Earth's climate system and its warm/cold phase has profound impacts on the global climate, because affects tropical atmospheric circulation (Walker and Hadley Cells, WC and HC). More generally, related changes in the Mean Meridional Circulation (MMC) may have dramatic influence on regional climate in specific areas of the Earth.
The response of Mean Meridional Circulation (MMC) to El-Niño/La-Niña events is investigated using 10 realizations of the ERA-20CM, the twentieth century (1900-2009) climate model ensemble performed by ECMWF.
The analysis is based on monthly average values of the following variables: the streamfunction (computed using zonally averaged meridional wind field, v), the zonally averaged zonal wind u, and precipitation minus evaporation (P-E) fields.
For each variables the coefficient of linear regression with Niño 3.4 Index is calculated and the effect of El-Niño/La-Niña events on strength, poleward extent and width of the Hadley and Ferrel Cells (HC and FC, respectively), distance between subtropical jet-streams and distribution of precipitation/evaporation is analyzed.
Results show that during the warm phase of the ENSO the HC shrinks equatorward with an intensification of the ascent branch in both hemispheres during the peak months (November-December-January). It is also shown that the FC consistently responds to warm phase of the ENSO, slightly shifting equatorward its boundaries and becoming weaker in both hemispheres. Further, subtropical jets strengthen and move equatorward during El-Niño events.