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## Internal variability of the Arctic Oscillation and its projections

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The Arctic Oscillation (AO) is one of the main modes of variability of the Northern Hemisphere winter, also referred as Northern Annular Mode (NAM). The positive phase of the AO is characterized by warming/cooling over Northern Eurasia and the United States and cooling over Canada, especially over eastern Canada. Its positive phase is also characterized by very dry conditions over the Mediterranean and wet conditions over Northern Europe. A positive trend of the AO is observed for the period 1951-2011 and it is captured in CMIP5 models only when GHG-only forcing are included. In CMIP5 models the change expected is mostly mitigated by the effects of the aerosols. When considering AR5 scenarios, the AO is projected to become more positive in the future, though with a large spread among the models.

Overall the spread in the representation of the AO variability and trend is large also in experiments with present-day conditions, likely associated with the large internal variability. Unique tools to identify and measure the role of the internal variability in the model representation of the large-scale modes of variability are large ensembles where multiple members are built with different initial conditions.

Here we use the NCAR Community Model Large Ensemble (CESM-LE) composing the historical period (1920-2005) to the future (2006-2100) in a RCP8.5 scenario to measure the role of the internal variability in shaping AO variability and changes. Potential predictability of the AO index is quantified in the historical and future periods, evidencing how the members spread remain large without specific trends in these characteristics. Preliminary results indicate that the internal variability has large influence on the AO changes and related implications for the Northern Hemisphere climate.

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