



## **Impact of internal multi-decadal variability on 20th century climate**

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Global climate exhibited a century scale warming during the 20th century that has been mostly attributed to external (natural and anthropogenic) forcing. In addition, pronounced multi-decadal variations were superimposed on this warming. Understanding the origins of these fluctuations is of central importance to decadal-prediction and for better constraining climate change projections. Here we investigate this using observations, a statistical model for external forced variability, and climate model simulations. Our results indicate the following:

1. Observed multidecadal fluctuations in global temperature were largely driven by internal variability originating in the Pacific and Atlantic sectors.
2. Internal climate variability contributed 20-30% to observed global warming during the last three decades.
3. The agreement between observations and externally forced climate model simulations during the last three decades reflects model over confidence and argues for the calibration of climate change projections.

The predictability of multi-decadal fluctuations over the 20th century will also be discussed.