

Does the AMOC vary with solar and volcanic forcing?

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The Atlantic Meridional Overturning Circulation at 26N has been measured since 2004 by the RAPID-MOCHA array. On a multi-year timescale it shows a decline with signs of a recovery since around 2012. This variability is likely to be part of decadal variability. We examine here whether solar and volcanic forcing could influence decadal variability of the AMOC in a coupled model run nudged to observations from 1960-2017. Temperature and winds are nudged throughout the atmosphere and potential temperature and salinity are nudged in the ocean, but the ocean velocities are allowed to vary freely. We nudge 10 different ocean analyses into the ocean model to get an ensemble of responses. The solar and volcanic forcing is the same in all members and both force El Nino Southern Oscillation (ENSO) and North Atlantic Oscillation (NAO) variability as found in many previous studies. ENSO and NAO in turn are found to explain more than half of all long-term variability in the AMOC at 26N through wind forcing associated with Rossby waves and western boundary waves. We therefore hypothesize that solar and volcanic forcing are important for long-term AMOC variability and use this knowledge to reconstruct the AMOC from 1870 to present day.