

Multi-decadal Variability of AMOC in the Community Climate System Model

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Multi-decadal variability of Atlantic Meridional Overturning Circulation (AMOC) is examined from a 700-year 1990 control integration of the NCAR Community Climate System Model version 3 with T85 atmospheric resolution (CCSM3) and a more recent 1300-year 1850 control integration of the 1 degree CCSM4. Emphasis is placed on the comparison between the AMOC based on the depth and the density as the vertical coordinate, respectively. Depth-based AMOC exhibits maximum near 40degN at the crossover between the northward Gulf Stream/North Atlantic Current and southward Deep Western Boundary Current. On the other hand, the density-based AMOC shows maximum near 55degN associated with the deep convection in the Labrador Sea. Therefore, the decadal variability in the time series of the maximum AMOC in density coordinate leads that in the depth coordinate by 1-2 yrs. However, the leading EOF modes of AMOC variability in both representations have maxima near the gyre boundary at ~40degN, suggesting the AMOC multi-decadal variability is dominated by the fluctuations of the boundary between the subtropical and subpolar gyres. The connectivity of the AMOC multi-decadal variability is examined from the time series of the various components of AMOC based on both vertical coordinates.