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Multi-decadal Atlantic Variability Simulated in CGCMs

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As observations are limited, Coupled General Circulation Models (CGCMs) are currently a necessary tool to study Atlantic Multi-decadal Variability (AMV). While some CGCMs indicate a pronounced multi-decadal signal in Atlantic, the range of simulated variability is wide. To understand these difference, here the mechanisms for AMV is study in various CGCMs. The Atlantic Meridional Overturning Circulation (MOC) plays a prominent role in AMV in most models. It makes a dominant contribution to oceanic heat transport via the northward flow of upper ocean warm water. Correlation analysis shows that in most models variations in the Atlantic MOC (30°N) lead variations in Sea Surface Temperature (SST), with the largest influence in mid-latitudes. Few models shows any relationship between MOC and North Atlantic Oscillation (NAO).
The mechanisms for AMV are further investigated in the KCM and MPI models with a 3-dimensional temperature and salinity EOF analysis. In particular, the subsurface variability of North Atlantic and its relation with wind driven circulation in the surface and sinking regions is investigated.