

**“CESM projections of AMOC weakening in the coming decade:  
mechanisms and impacts”**

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While the North Atlantic Oscillation (NAO) has fluctuated between positive and negative wintertime values in recent years, the mean NAO index of the past decade is negative, punctuated by an extreme NAO<sup>-</sup> winter in 2010. This contrasts sharply with the persistent positive NAO forcing of the 1980s and early 1990s, which has been linked to an anomalously warm subpolar gyre (SPG) in the mid- to late 1990s as a result of a strengthened overturning circulation. We present evidence of a sharp reduction in North Atlantic Deep Water formation since the mid-1990s, associated with the more neutral-to-negative NAO conditions of recent years, and of an associated slow-down of the buoyancy-driven circulation at high latitudes. Coupled decadal prediction ensembles using the Community Earth System Model (CESM) initialized from present day conditions indicate that negative high latitude density anomalies will propagate equatorward in the coming decade, leading to a weakened AMOC throughout the northern hemisphere, and a continuation of the recently observed cooling of the subpolar gyre. The future climate impacts associated with an anomalously cold SPG are discussed.