Century-long cooling trend in subpolar North Atlantic forced by atmosphere: an alternative explanation

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A well-known exception to rising sea surface temperatures (SST) across the globe is the subpolar North Atlantic, where SST has been declining at a rate of 0.39 (±0.23) K per century during the 1900–2017 period. This cold blob has been hypothesized to result from a slowdown of the Atlantic Meridional Overturning Circulation (AMOC). Here, observation-based evidence is used to suggest that local atmospheric forcing can also contribute to the century-long cooling trend. Specifically, a 100-year SST trend simulated by an idealized ocean model forced by historical atmospheric forcing over the cold blob region matches 92% (±77%) of the observed cooling trend. The data-driven simulations suggest that 54% (±77%) of the observed cooling trend is the direct result of increased heat loss from the ocean induced by the overlying atmosphere, while the remaining 38% is due to strengthened local convection. An analysis of surface wind eddy kinetic energy suggests that the atmosphere-induced cooling may be linked to a northward migration of the jet stream, which exposes the subpolar North Atlantic to intensified storminess.