

Reconstructing Atlantic temperature and overturning variability over the last millennium with paleoceanographic and instrumental data

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Recent studies have begun to piece together the temperature evolution and AMOC variability over the last millennium. Some paleoceanographic proxies suggest a long-term AMOC slowdown over the 20th Century, but it is unclear how these records fit together with instrumental data. Repeat hydrographic cruises in the Labrador Sea since the 1920s, for example, do not show a monotonic trend in the temperature, salinity, or depth of Labrador Sea deep water formation. Here an inverse method is used to constrain a numerical model to paleoceanographic proxies over the Common Era as well as historical hydrographic data going back to the HMS Challenger expedition in the 1870s. The aim of this method is to reconstruct Atlantic temperatures and the AMOC in four-dimensions. The reconstruction permits the Medieval Warm Period and Little Ice Age to impact the deep Atlantic for multiple centuries. Ultimately, we address the question of whether paleoceanographic and instrumental data tell a consistent story about AMOC variability on decadal and longer timescales.