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Tracking the Atlantic Multidecadal Oscillation through the last 8,000 years

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Understanding the internal ocean variability and its influence on climate is imperative for society. A key aspect concerns the enigmatic Atlantic Multidecadal Oscillation (AMO), a feature defined by a 60-90-yr variability in North Atlantic sea-surface temperatures. The nature and origin of the AMO is uncertain, and it remains unknown whether it represents a persistent periodic driver in the climate system, or merely a transient feature. Here we show that distinct ∼55-70-year oscillations characterised the North Atlantic ocean-atmosphere variability over the past 8,000 years. Comparative studies of instrumental and proxy records indicate that this multidecadal variability reflects the AMO. We test and reject the hypothesis that this climate oscillation was directly forced by periodic changes in solar activity. We therefore conjecture that a quasi-persistent ∼55-70 year AMO, linked to internal ocean-atmosphere variability, existed during large parts of the Holocene. Our analyses further suggest that the coupling from the AMO to regional climate conditions was modulated by orbitally-induced shifts in large-scale ocean-atmosphere circulation.