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KEYNOTE: Dansgaard-Oeschger and Heinrich event temperature anomalies in the North Atlantic: follow the heat

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Here, using eighteen timescale-synchronised near-surface temperature reconstructions spanning 10–50 thousand years before present, we clarify the spatial extent and amplitude of Dansgaard-Oeschger (D-O) and Heinrich (H) event temperature anomalies in the North Atlantic. The North Atlantic Drift region shows D-O temperature variations (of ca. 2–5℃) with Greenland-like structure. The Western Iberian Margin region also shows D-O temperature variations with Greenland-like structure, but with much greater surface cooling between interstadials and Heinrich stadials (ca. 6–9℃) than between interstadials and non-Heinrich stadials (ca. 2–3℃). The southern Nordic Seas show smaller D-O temperature anomalies (ca. 1–2℃) that appear out of phase with Greenland. The spatial pattern and amplitude of these D-O and H event temperature anomalies are matched remarkably closely in results from a new global climate model simulation that features spontaneous (D-O-like) and fresh-water forced (H-like) abrupt climate changes. We use the model and observations to show how the spatial expression and amplitude of D-O and H event temperature anomalies are dominated by coupled changes in the Atlantic Meridional Overturning, sea ice extent, polar front position and thermocline structure. Our results support the view that D-O events are part of an oscillatory climate mode that is not reliant on a systematic trigger.

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