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Changes in El Nino - Southern Oscillation (ENSO) conditions during the Younger Dryas revealed by New Zealand tree-rings.

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The warming trend at the end of the last glacial was disrupted by rapid cooling clearly identified in Greenland (Greenland Stadial 1 or GS-1) and Europe (Younger Dryas Stadial or YD). This reversal to glacial-like conditions is one of the best known examples of abrupt change but the exact timing and global spatial extent remains uncertain. Whilst the wider Atlantic region has a network of high-resolution proxy records spanning the YD, the Pacific Ocean suffers from a scarcity of sub-decadally resolved sequences. Here we report the results from an investigation into a tree-ring chronology from northern New Zealand aimed at addressing the paucity of data. The conifer tree species kauri (Agathis australis) is known from contemporary studies to be sensitive to regional climate changes. An analysis of a 'historic' 452-year kauri chronology confirms a tropical-Pacific teleconnection via the El Niño – Southern Oscillation (ENSO). We then focus our study to a 1010-year subfossil kauri chronology that has been precisely dated by comprehensive radiocarbon dating and contains a striking ring-width downturn between ∼12,500 to 12,380 cal BP within the YD. Wavelet analysis shows a marked increase in ENSO-like periodicities occurring after the downturn event. Comparison to low- and mid-latitude Pacific records suggests a coherency in the changes to ENSO and Southern Hemisphere westerly airflow during this period. The drivers for this climate event remain unclear but may be related to solar changes that subsequently led to establishment and/or increased expression of ENSO across the mid-latitudes of the Pacific, seemingly independent of the Atlantic and polar regions.