

Supplementary Information Guide

Titles

Supplementary Table 1: Subannually resolved tropical Pacific coral records

Supplementary Table 2: U-series dating report for novel Vanuatu corals.

Supplementary Table 3: Observational products in this study.

Supplementary Table 4: Vanuatu and Kiritimati coral data in this study.

Supplementary Table 5: Background conditions and durations in CESM1.2 simulations.

Supplementary Table 6: Reference intervals and thresholds for extreme El Niño frequencies.

Supplementary Table 1 (.csv file)

This table lists subannually-resolved tropical Pacific coral records, including locations, sample identifiers, ages, record lengths, and references to the original studies. It underpins Fig. 1b and Extended Data Fig. 1b and ensures transparency and reproducibility by documenting the datasets used and provides a consolidated reference for coral records in the tropical Pacific.

Supplementary Tables 2–6 (.pdf file)

These tables present U-series dating results for novel Vanuatu corals, a reference of new and published coral records analysed in this study, observational products, and supporting data sets. Collectively, they document the geochemical and observational foundations of the work and support reproducibility of the analyses.