Eastern Pacific corals record sea surface temperature variability over the last millenium

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Résumé

The tropical Pacific is under the influence of different climate modes (from the seasonal to the decadal timescale) and, through teleconnections, affects the global climate. The tropical Pacific is also subject to strong and variable zonal sea surface temperature (SST) gradients at the interannual timescale (El Niño Southern Oscillation phenomenon: ENSO). A large amount of climate records are available in the western and the central part of the Pacific and allow the reconstruction of SST. On the contrary there is a critical lack of data in the eastern part of the Pacific Ocean. In order to fill this void, we present new geochemical results (Sr/Ca-based SST) obtained from massive aragonitic coral skeletons (Porites genus) from Clipperton atoll (10∘N, 109∘W), ideally located for our scientific purpose. Two corals Sr/Ca-based SST records accurately dated by U/Th method covering a part of the 12th (end of the Medieval Warm Period) and a part of the 16th (beginning of the Little Ice Age) centuries will be compared to a 19th-20th coral SST record. Observed mean cool conditions for both periods relative to the present period (three last decades) seem to support previous SST reconstructions (-2.40±3∘C and -1.80±3∘C respectively). In term of interannual variability, recent ENSO activity seems not atypical contrary to previous hypothesis; for instance, intensity and frequency of ENSO were stronger during the early LIA (_˜±0.30∘C and up to 4 events/20 years relative to _˜±0.20∘C and 2 events/20 years for the 20th century). This suggests that the recent ENSO activity may be caused by a large natural internal variability independent of the anthropogenic forcing. Moreover, our first eastern Pacific millennia snapshots ENSO-related SST variability reconstructions will allow to estimate the ability of climate models to reproduce ENSO-related SST variability and the relatives Pacific background conditions.

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