

Sea surface temperature variability in the north side of the South China Sea over the last 55 years revealed by coral $\delta^{18}\text{O}$ records

ZICHENG PENG^{1,2}, JIANFENG HE¹, TEGU CHEN³,
BAOFU NIE³ AND GUIJIAN LIU¹

¹The School of Earth and Space Science, University of Science and Technology of China, Hefei, 230026, China (pzc@ustc.edu.cn)

²State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment, CAS, Xi'an 710075, China

³South China Sea Institute of Oceanology, CAS, Guangzhou 510301, China

We have used correlative analysis between month sea surface temperature (SST), measured at the Qinglan Meteorological Observatory, and the $\delta^{18}\text{O}$ values for the corresponding month from *Porites lutea* coral, collected in Longwan Bay, the north side of South China Sea (19°20'N, 110° 39'E), to obtain a line equation relating the two datasets: $\text{SST} = 4.89 - 4.16 \delta^{18}\text{O}$ (‰PDB), $r = 0.80$, $n = 214$, $P = 0.01$. From this, the variability of the calculated SST series from 1944 to 1998 is shown in Figure 1

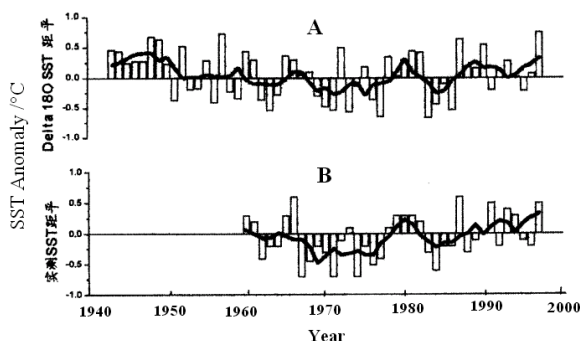


Figure 1: The SST variability from 1944 to 1998. A : the calculated SST series; B: the observed SST series

Figure 1 shows the decadal or near-decadal variability of the SST series has been decreasing from 1944-1949 to the 1960s and increasing from the 1970s to 1990s. The higher SST values indicate in 1944-1949 and the 1990s. The average of annual SST values from 1950 to 1976 is 25.84°C, while that has an increase to 26.11°C from 1977 to 1998. A shift of the SST series appears around 1976. The spectral analysis of a 55-yr-long SST series produces the peaks at 2-2.4 yr (QBO band) and 3-8 yr (ENSO band). Therefore, we postulate that the SST variability in South China Sea is controlled by global change. This research was supported by G1999043401.

Can accurate Pb isotopic compositions be determined on single fluid inclusions?

T. PETTKE¹, U. H. WIECHERT¹, A. AUDETAT²,
D. GÜNTHER³ AND C. A. HEINRICH¹

¹ETH Zürich, IGMR, ETH Zentrum NO, CH-8092 Zürich, Switzerland (pettke@erdw.ethz.ch)

²Inst. für Mineralogie, D-72074 Tübingen, Germany (andreas.audetat@uni-tuebingen.de)

³ETH Zürich, Lab. Inorg. Chem., Hönggerberg, CH-8093 Zürich, Switzerland (guenther@inorg.chem.ethz.ch)

Dissolved metals are now accurately quantified from single fluid inclusions (FI) by laser-ablation inductively-coupled-plasma mass-spectrometry (LA-ICPMS), providing constraints on hydrothermal processes. Here we explore the analysis of Pb isotope compositions of single FI to trace metal sources, aiming at an integrated model of hydrothermal ore deposit formation.

Synthetic fluid inclusions of known Pb and Tl isotopic compositions (SRM981 and SRM997) were prepared at 700°C / 1.8 kbar for 144 h, at nominal concentrations of 5190 µg/g Pb, 1790 µg/g Tl, 10.5 wt-% NaCl and 5.9 wt-% KCl, respectively. The run products contained FI of up to 100 µm size and black Tl crystallites in new-grown quartz, hence the Tl-concentration of the FI is significantly below the nominal value. Laser-ablation ICPMS was performed using a NuPlasma and Nu1700 multiple collector ICPMS (NU Instruments, Wrexham, UK) in transient data acquisition mode, and a Geolas 200Q with computer-controlled sample stage. Raw data were corrected for Hg-interference (<0.5% on mass 204) and for mass bias (exponentially by $^{203}\text{Tl}/^{205}\text{Tl} = 2.3871$). Analyses on NIST SRM610 at variable ablation conditions (pit size, signal duration, repetition rate, rastering and single spot ablation) were identical to the values of Platzner et al. (2001) within 100-200 ppm (2σ SE) for isotope ratios normalized to ^{204}Pb and 50-100 ppm for $^{207/6}\text{Pb}$ and $^{208/6}\text{Pb}$ ratios, respectively.

Analyses of single Pb-Tl FI yield correct Pb isotopic ratios, albeit at poorer analytical precision (a few permil 2σ SE for $^{206/4}\text{Pb}$, $^{207/4}\text{Pb}$, and $^{208/4}\text{Pb}$, and several hundred ppm for $^{207/6}\text{Pb}$ and $^{208/6}\text{Pb}$). No difference in accuracy was observed between entirely and partially ablated inclusions. Porphyry-type ore-related FI typically contain up to 10000 µg/g Pb. There are two possibilities for quantification: (a) use of naturally occurring Tl (up to a few 100 ppm in fluids related to Sn-W deposits), or (b) by admixture of Tl via desolvating nebulization. The analytical precision on single FI Pb isotopic analysis reported here is well suitable to resolving natural Pb isotopic variability documented for hydrothermal systems.

Reference

Platzner et al. (2001) *Fres. J. Anal. Chem.* **370**, 624-628.