Non steady state diagenesis in hydrothermal systems records oceanic variability over the last 800ka in the South East Pacific

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Redox sensitive metal distributions in hydrothermal sediments have yet to be exploited effectively as paleoproxies of past ocean conditions. We present an 800 ka supralysocline sediment record from an archived core (GS 7202-35) from a site at 14°S overlying 1.1 Ma crust on the western ridge flank of the East Pacific Rise. An age model for the sediment accumulation was constructed by correlation of the bulk sediment $\delta^{18}O$ record with a composite time series obtained from core V1930 and ODP 677. The sediment accumulation rates inferred from the age model in this core are between 1.2 – 2 cm/ka. The significant transition metal enrichments in this core are derived from locally significant hydrothermal plume input. This metalliferous sedimentation is overprinted by diagenetic mobilisation arising from variations in the redox status of the sediments. The core is oxic at the surface with significant Mn and Fe remobilisation but no evidence for sulphate reduction. Mn (present as Mn oxides) is variably enriched throughout the core compared with oxic metalliferous sediments to the east of the ridge axis. High Mn/Fe (and Mo/Fe and Cu/Fe) ratios are inferred to represent the past location of the downward migrating Mn redox front. High U/Fe ratios occur directly below the Mn/Fe peaks corroborating the paleoredox interpretation. P/Fe ratios correlate with U/Fe indicating significant Fe cycling is occurring at this site. There is a general trend over MIS 1-14 of a deepening of redox front through interglacial stages with a shallowing at the onset of glaciation. There is a ~100 000 kyr periodicity in the paleoenvironmental controls on redox status of the sediment in this region which is consistent with palaeoproductivity data from other parts of the Eastern Pacific which indicate enhanced glacial productivity