

Changing Sub-Surface Chemistry Resulting from a 26-Million-Year Unconformity: Porewater Chemistry from IODP Site U1553 in the South Pacific

ALEX REIS¹, VANESSA FICHTNER² AND ANDREA M
ERHARDT^{1,3}

¹University of Kentucky

²Linnaeus University

³University of Kentucky/ Technical University of Munich

Presenting Author: andrea.erhardt@uky.edu

While changes in pore water chemistry are known to impact carbonate sediment geochemistry, little is known about the impact of long unconformities on carbonate alteration. IODP Site 378-U1553 on the southern Campbell Plateau, with a 26-million-year, erosional unconformity, provides a key location for examining the impact of long-term unconformities on sub-surface chemistry and carbonate archives. This study examined 76 interstitial water samples for sulfate sulfur and oxygen isotopes, as well as 28 bulk carbonate samples for carbonate associated sulfate (CAS) sulfur isotopes, to quantify the effects of this unconformity on the sub-surface redox chemistry of the Site. The current state of the system suggests limited influence of redox processes on the carbonate associated sulfate archive. Manganese reduction reaches 30 mbsf, with a decrease in manganese reduction between 20 and 30 mbsf. Below 30 mbsf, the system transitions to iron reduction to a depth of approximately 140 mbsf where sulfate reduction begins. Dissolved sulfate sulfur and oxygen isotope values suggest repeated oxygenation of sulfides. The carbonate associated sulfate record from the Site deviates from previously published seawater values. However, the lack of a relationship between the dissolved sulfate and CAS records suggests most of the alteration of the CAS record likely occurred before the unconformity when the carbonate sediments were more reactive. This further supports the CAS record as a relatively robust archive, withstanding most post-depositional mechanisms of carbonate alteration.