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New micro-tomography based carbonate dissolution index applied to a deep-sea record from the Western Indian Ocean

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The problem of carbonate dissolution has to be considered in studies of foraminifera based proxies for climate reconstruction. For instance dissolution is known to first affect Mg-rich calcite meaning that temperatures derived from Mg/Ca will be too low. Foraminifera shell weight has been used to assess dissolution, despite the fact that initial test weights can vary due to several suggested factors such as nutrient availability, carbonate-ion concentration and temperature. We have developed a dissolution index based on X-ray micro-tomography (XMT) for *N. dutertrei* and applied this index to sediment core WIND 28K from 4150 m water depth in Amirante Passage North of Madagascar. The corrosiveness of the bottom water at the site is controlled by the carbonate saturation of the Circumpolar Deep Water and the volume transport of the deep western boundary current. From the fluctuations in the weight of *N. dutertrei* tests several episodes of dissolution can be identified. The additional detail given by XMT shows that in fact little of the core is unaffected by dissolution; and that some periods of strong dissolution are not reflected in the weight record presumably due to changes in the initial weight of the tests.

The interglacial stages 1 and 5 as well as the glacial MIS 4 are all periods of increased

dissolution at the site, although atmospheric CO_2 levels and, hence carbonate-ion concentration in the deep ocean, were very different. Mg/Ca shows temperatures peaking during glacial terminations 1 and 2 followed by cooling. Comparison between published Mg/Ca values and our dissolution index for N. dutertrei from an Ontong Java Plateau depth transect suggests that some of the observed drop in temperature is an artifact of dissolution affecting Mg/Ca rather than a real signal of tropical Indian Ocean surface ocean temperature.