

Reconstructing Circumpolar Deep Water: A new Mg/Ca-Temperature calibration for the benthic foraminifer *Trifarina angulosa* around Antarctica

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Abstract

The West Antarctic Ice Sheet (WAIS) represents a large potential source of sea level rise. Observations of ice sheet instabilities in the region have increased in recent decades, with a 77% recorded increase in the net loss of glaciers the Amundsen Sea Embayment (ASE) sector of the WAIS since 1973. This has been attributed to increasing basal melting of floating ice shelves caused by warmer Circumpolar Deep Water (CDW) upwelling onto the shelf. Understanding the role of CDW in glacial retreat in the ASE over longer timescales is key to reducing the uncertainty of future sea level predictions. The aim of this research is to reconstruct CDW incursions onto the ASE continental shelf and correlate them to the glacial history of the area since the Last Glacial Maximum. To achieve this, it is crucial to develop a proxy for detecting the presence or absence of CDW.

Whilst foraminiferal preservation is rare in this locality due to the corrosive nature of water masses around the Antarctic Peninsula, several cores from the ASE contain specimens including the benthic species *Trifarina angulosa*, which is a shallow infaunal species therefore ideal for Mg/Ca temperature reconstructions. Here we present a core-top calibration for *T. angulosa* for temperatures between -1.75°C and +1.5°C from sites situated in the Southern Ocean. We apply this Mg/Ca temperature calibration to down-core archives at several sites, which are well-dated using radiocarbon. The results are presented here along with benthic and planktonic foraminiferal stable isotope data and complementary trace metal data.

Keywords: Circumpolar deep water, foraminifera, Mg/Ca