Paleoceanographic variations in SE sector of Indian Ocean (Australian shelf, IODP-U1460 site): is the MIS12 the trigger for long-term oceanic circulation re-organisation? Insights from benthic meiofauna (ostracods and foraminifera)

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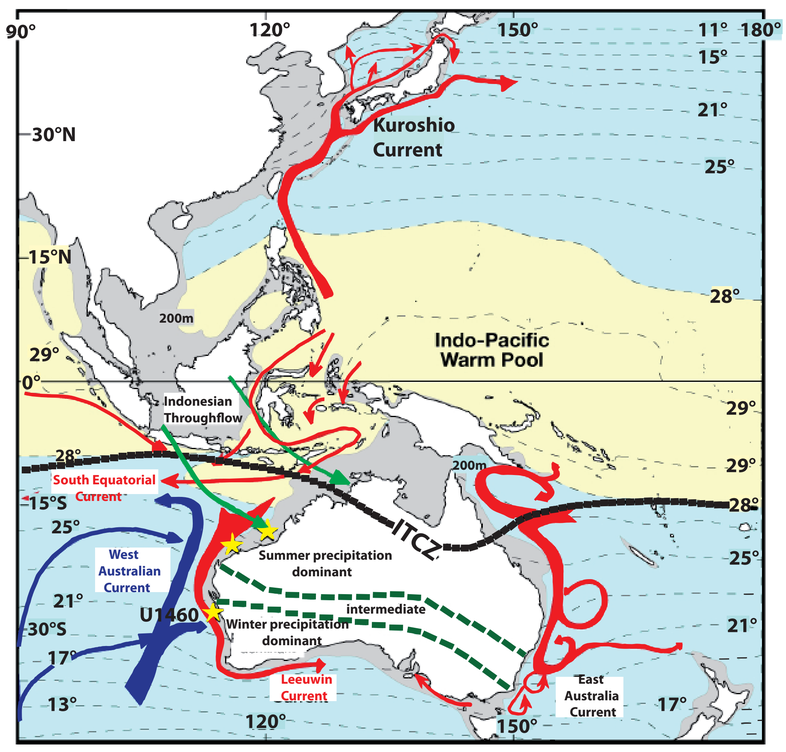

Figure 1: Western Pacific oceanography and climatic conditions (Gallagher et al., 2017).

Australia west margin: oceanographic setting

Indonesian Throughflow plays a key role in transporting heat and salinity from the Equatorial Pacific (the Indo-Pacific Warm Pool) to the Indian Ocean and exerts a major control on global climate (Vranes et al., 2002; Kuhnt et al., 2004). The Indonesian Throughflow supply relatively fresh and warm water that contributes to the formation of the southward-flowing Leeuwin Current (Cresswell, 1991; Pearce, 2009, Gallagher et al., 2014). The shallow and narrow Leeuwin Current (<100km wide, <300m deep) transport warm, low salinity, nutrient-deficient water southward along the west coast of Australia (Pattiaratchi, 2006).

Material and method

Micropaleontological and isotopic analyses were performed on 93 samples covering the first 50m of borehole U1460 (Fig . 1) in the aim of reconstructing the paleo-environmental and paleo-climatic conditions of Western Australian shelf. Borehole U1460 was drilled at a water depth of 214m during IODP 356 expedition. The counting and identification of benthic and planktonic foraminifera and ostracods were carried out under a binocular microscope on the > 150µm fraction. R-mode Hierarchical cluster analysis was perfom using the PAST software. The age model applied in this study was established on the basis of the variation of d18O measured in planktonic foraminifer *Globigerina ruber*.

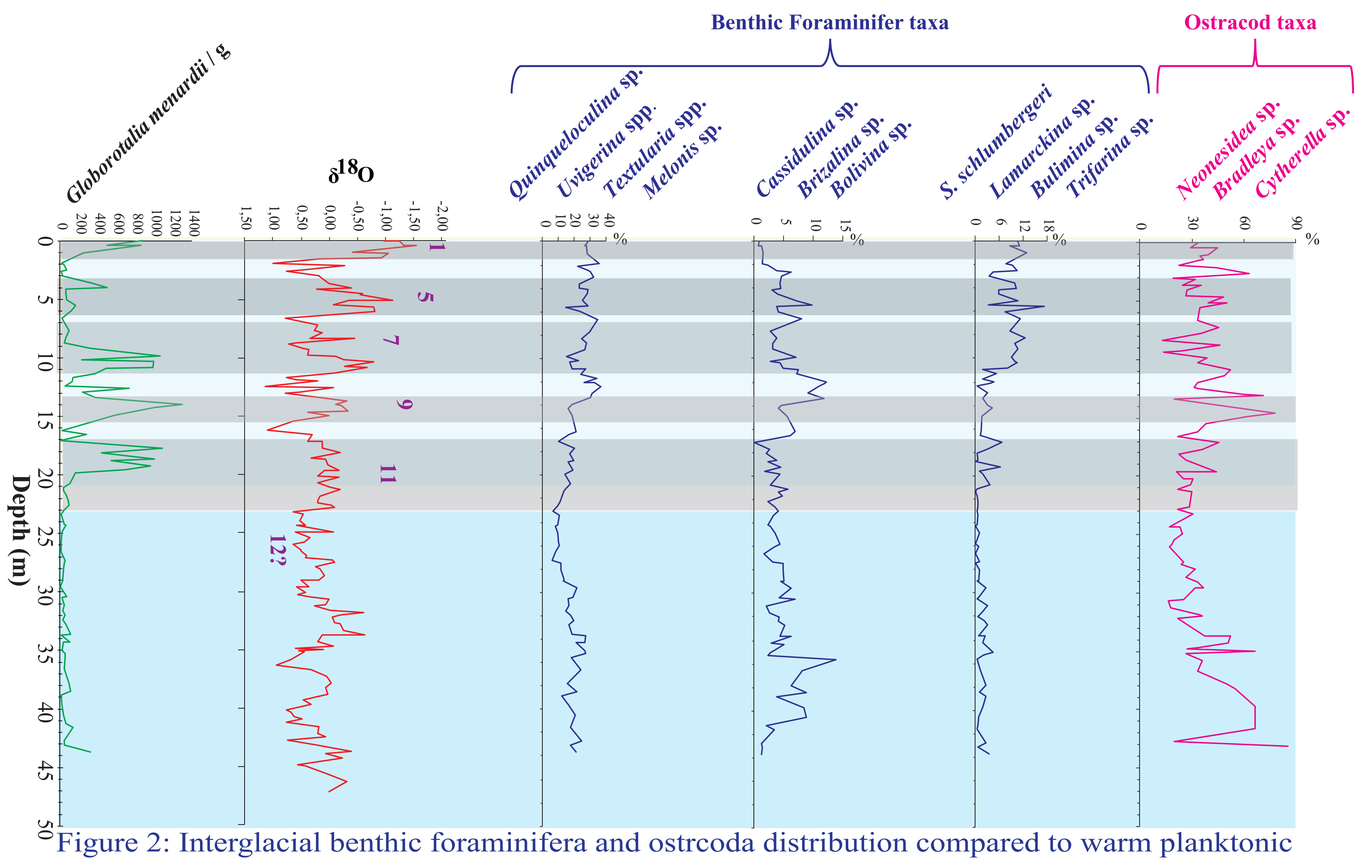

Figure 2: Interglacial benthic foraminifera and ostrcoda distribution compared to warm planktonic foraminifera (***Globorotalia menardii***) and **δ18O** distribution.

In figure 2, **the interglacial assemblage** is characterized by :

ostracods species such as :
Neonesidea sp., *Bradleya* sp., *Cytherella* sp.;

by benthic foraminifera as :
Melonis sp., *Uvigerina* spp., *Quinqueloculina* sp., *Textularia* sp., *Trifarina* sp., *Cassidulina* sp., *Brizalina* sp., *Bulimina* sp., *Sigmoilopsis schlumbergeri*.

These assemblages suggest warm bottom conditions under well-oxygenated, high energy regimes and imput nutrient supply.

In figure 3, the glacial assemblage is composed by :

Ostracod genera/species such as:
Pterigocythereis sp., *Krithe* spp., *Argilloecia* sp., *Pseudocythere caudata*, *Trachyleberis* sp.

Benthic foraminifera such as :
Cibicides lobatulus, *Elphidium* sp., *Hyalinea* sp., *Rosalina bradyi*.

These assemblages indicate cold bottom condition with probably poorly oxygenated and organic- rich sediment environment (Fig. 3).

In Figures 2 and 3, the distribution of benthic foraminfera and ostracoda assemblages associated with planktonic foraminifera variation allow to characterized two main climatic phases : one dominated by generally cold conditions (glacial-like, from 50 to 20 m) and another interglacial-like phase (from 20 to 0 m), characterized by warmer climate. Those have been identified on the basis of distribution of tropical warm water *Globorotalia menardii* (planktonic foraminifer) that shows high abundance only from 20 to 0 m, attributed to the interglacial-like phase, coherent with δ18O values curve.

Those two phases include probably multiple glacial and interglacial stages but the most spectacular result indicates that after the onset of MIS12, the oceanographic conditions in the Western Australia sector changed deeply, either because of oceanic current re-organization or because of the continental climate change (dry/wet climate transition) that controls the amount of micronutrient input into the ocean.

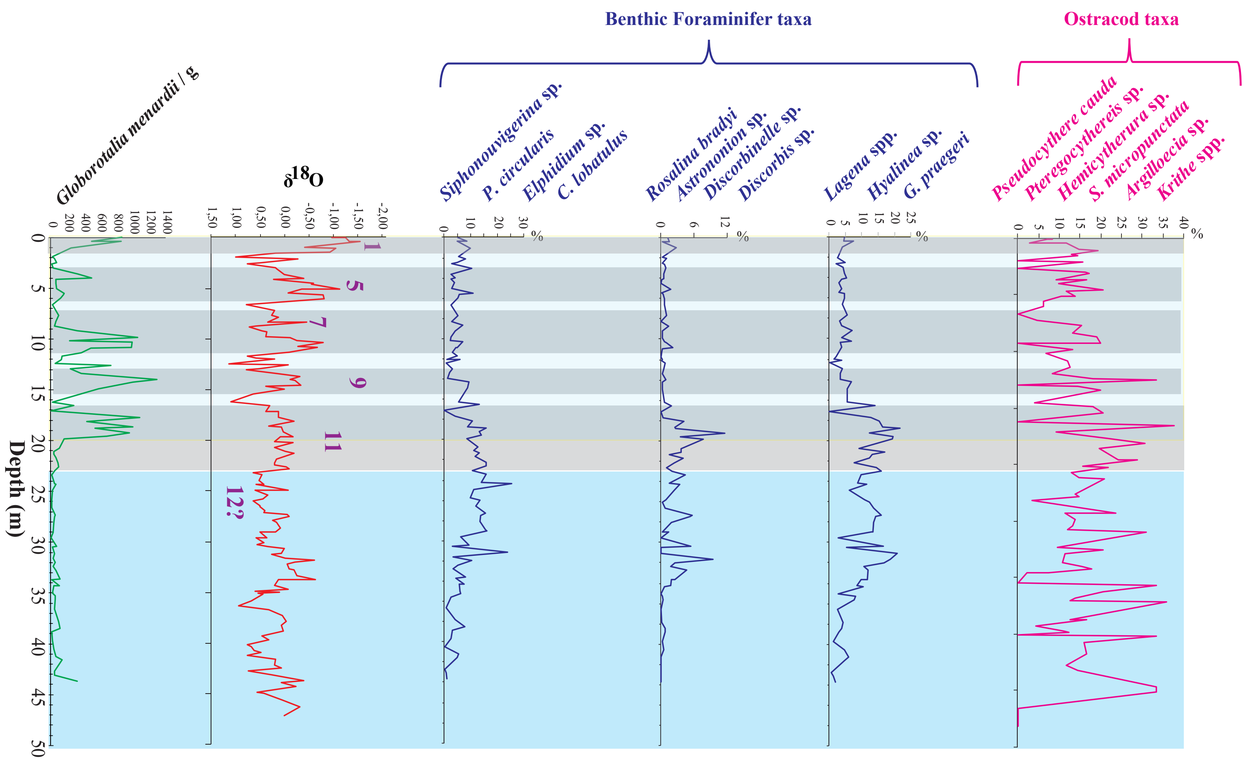

Figure 3: Glacial benthic foraminifera and ostrcoda distribution compared to warm planctonic foraminifera (***Globorotalia menardii***) and **δ18O** distribution.

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