

Late Quaternary changes in the oceans surrounding Australia - a Southern Hemisphere perspective of the global ocean and lessons for the future

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Australia sits at the confluence of 3 important oceans. Northern Australia borders the Indo Pacific Warm Pool which sees the transfer of Pacific Ocean waters into the Indian Ocean via the Indonesian Throughflow [ITF]. This is the region of significant transfer of moisture to the upper atmosphere through high convective clouds. It is called the 'Heat Engine of the World'. It is also a dilution basin as monsoonal rains dilute the ITF waters during its passage through the Indonesian Archipelago and, consequently, a shallow barrier layer occurs near the surface, thus preventing exchange of gases between the atmosphere and the deeper ocean below it. The Southern Ocean, on the other hand, with its waters bathing southern Australia, circumnavigates the globe and is currently a significant CO₂ sink and, in combination with the westerlies, moderates climate in the Southern Hemisphere. This wind belt, when shifting latitudinally, can have important implications for the transfer of heat and salt to the northern hemisphere via the Agulhas leakage south of South Africa.

I will present information on past environmental changes recorded in key cores offshore southern and northwestern Australia that indicate a clear antiphase mode with changes that occurred in the oceans in the northern hemisphere. This phenomenon has been referred to as the 'bi-polar see saw'. Using that information, I will advance the idea that the Southern Hemisphere is often taking the lead in global climate changes, despite the fact that the waxing and waning of the glacial ice caps in the northern hemisphere did play a crucial role in sea level changes and oceanic reorganization.

I aim at discussing ways at examining the behaviour of our oceans in the past with respect to predict future changes by looking at periods during the Quaternary that may offer analogues to future changes.