ASSESSING VARIATION IN ATMOSPHERIC AND OCEANIC CIRCULATION IN THE SOUTHWEST PACIFIC DURING PLIO-PLEISTOCENE

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ABSTRACT

Typically, the formation of petroleum from marine organic matter is associated with highly productivity interglacial periods or transgressive sequences in which rising sea level causes oxygen minimum zones to migrate land ward with expansion over continental shelves. However, a mechanism invoked for regulating atmospheric CO2 draw down during glacial periods involves enhanced primary productivity with increased micronutrients to the Southern Ocean. ODP Site 1123, located in the southwest Pacific east of New Zealand on the North Chatham Rise, lies in an optimal location in that the STF in this region is bathymetrically locked and both surface ocean circulation and deep ocean circulation in this region is dominated by the westerly winds. Thus, provides an ideal opportunity to quantify changes in iron dust flux and surface ocean productivity during a time of globally higher sea level but also coinciding with gradual cooling and atmospheric CO2 drawdown. The goal of this project is to develop a high resolution, orbitally resolved Plio-Pleistocene record of sedimentological and geochemical proxy records to understand the complexities associated with climatically driven depositional processes along continental margins. I will examine the relationship between atmospherically windblown dust and productivity changes in the Southern Ocean across major perturbations in the carbon cycle to better understand the transfer of carbon between the ocean-atmosphere system. Detailed grain size analysis will be carried out for comparison with physical property porosity gamma-ray attenuation (GRA) data sets. X-ray fluorescence (XRF) analysis will be carried out for Si/Al, Fe/Al and Ti/Ca measurements as proxies for increased dust transport. Ba/Al measurements will add insight on productivity changes across the STF. This data will be complimented by productivity estimates from biomarkers (i.e., alkenones) and estimates concerning the accumulation of terrestrial lipids carried out by collaborators.