

Investigation of a long term increase in marine carbonate production and accumulation with implications for atmospheric CO₂

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This project aims to constrain long term changes in carbonate production in the surface ocean over the last million years. Pelagic carbonate production is an important component of the global carbon cycle and is therefore relevant to understanding changes in atmospheric CO₂. It is thought that a global increase in pelagic carbonate production occurred between about 600 and 200 thousand years ago, yet evidence from ice cores suggests that no corresponding change in atmospheric CO₂ resulted. This may suggest a gap in our understanding of how the carbon cycle is operating and it is therefore important to investigate these changes further. The project will involve analysis of a marine sediment core from the Southern or Pacific Ocean. Several analytical techniques will be employed to determine the changes we are interested in. These include measurement of cosmic Helium 3 (³He), carbonate and silica contents and possibly stable isotope and trace metal analyses of fine fraction carbonate if time permits. ³He, delivered by interplanetary dust to the earth surface, can be used as a “constant flux” proxy and is therefore very valuable in determining absolute changes in the accumulation of marine sediment components. This project will be the first to use this tool for this type of investigation.