Earth Observation

Centre for Doctoral Training

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A multidisciplinary approach to quantifying oceanographic pathways around Antarctica and their impacts on climate

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Please note the successful applicant for this project will be required to start in June 2021

The Southern Ocean is the conduit through which heat and freshwater, as well as biogeochemical properties, are transported between all ocean basins. As water masses squeeze through the Drake Passage, the 'pinch point' between South America and the Antarctic peninsula, they transport carbon, heat and nutrients into the South Atlantic, all of which can influence global climate through physical and biological carbon cycling. The flow along the shelf break of the western Antarctic Peninsula is hypothesised to be the key route transporting the sediment-derived micronutrient iron to South Atlantic waters. However, relatively little is known about the time scale of this pathway, a key parameter in understanding the role iron supply plays in promoting primary productivity and carbon drawdown in this iron-limited region.

This project will produce the first 2-D section of radium and actinium observations across the Drake Passage, elements that provide time information for processes spanning the range of time scales necessary to trace sedimentary fluxes from shallow (Ra) and deep (Ac) sediments. Raw data - collected during the 2018-2019 field season - will be manipulated, processed, evaluated and visualised, providing opportunities to learn and practice a range of programming skills and tools. Forming a contribution to a peer-reviewed journal article, the results will then be compared to other ship-based records and satellite observations of ocean temperature and colour, to identify changes in the distribution patterns of water masses and current front locations, and crucially the transport timescales of nutrients, trace elements and heat from shelf waters.