Using observations from space and the deep ocean to uncover the ocean's role in climate change

Supervisors
Main supervisor: Dr Rory Bingham (University of Bristol)
Co-supervisor: Dr Matthew Palmer (Met Office)
Co-supervisor: Professor Paul Valdes (University of Bristol)
Project enquiries - Email: rory.bingham@bristol.ac.uk Contact number: +44 (0) 01173314157
Host Institution: University of Bristol

Project description:

Although emissions of greenhouse gases have continued unabated since the late 1990s, the Earth’s global mean surface temperature has been increasing more slowly than expected. This has prompted much debate in the media and has been seized on by some to deny our impact on the climate system. In fact, deviations in the rate of warming are to be expected due to natural variability within the Earth system. Given the complexity of the climate system, it is true, however, that our knowledge of the physical processes underlying this natural variability remains incomplete. A fuller understanding is crucial to countering spurious arguments regarding global warming and to making more accurate predictions of decadal climate variability – a timescale over which deviations from the anthropogenic rate of warming can have serious economic and social consequences.

Given the ocean’s vast thermal capacity, a number of studies have attributed the recent slowdown in the rate of global surface temperature rise to increased oceanic heat storage. Yet, the mechanisms leading to changes in heat uptake by the ocean are still poorly understood. Indeed, there is little consensus even on where in the ocean the extra heat is being stored. This project will draw on satellite observations of sea level and earth’s gravity field, measurements of deep ocean temperature, salinity and current velocity and a range of state-of-the-art climate and ocean models to address these shortcomings in our understanding of the ocean’s role in decadal climate variability. The primary scientific questions you will address are: 1) Where in the ocean is the extra heat being stored? 2) What are the primary mechanisms by which the heat is entering the ocean? 3) How will a warming climate impact on the storage of heat by the ocean?
This project will place you at the forefront of climate research, working with leading climate scientists from Bristol University and the Met Office to address a question of great scientific and societal concern. In so doing you will gain a wide range of valuable experience, equipping you with a deep understanding of the climate system, the mathematical and computing knowledge required to extract meaningful information from large datasets, and the ability to present complex ideas, both in written and verbal form, to a wide range of audiences. You will gain practical experience of instrumentation and data collection by participating in at least one scientific research cruise to collect data from the deep ocean.