

Radiocarbon measurements to balance the UK carbon budget

Supervisors

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Project description

It is vital that we accurately quantify the UK's carbon dioxide (CO₂) emissions. However, one difficulty is that the net exchange of CO₂ between the land or ocean surface and the atmosphere is due to a complex mixture of both anthropogenic and natural sources and sinks. Measurements of radiocarbon (¹⁴C, a heavy, unstable isotope of ¹²C) in atmospheric CO₂ may provide valuable clues about the magnitude of the UK's man-made emissions. This is because fossil fuels, having been buried beneath the ground for millennia, do not contain ¹⁴C, which has a lifetime of a few thousand years, and can therefore be used as a tracer of anthropogenic activity. When combined with models of atmospheric chemistry and transport, ¹⁴C-CO₂ measurements can be used to determine the magnitude of the UK's fossil fuel CO₂ emissions.

In this project, you will develop an atmospheric ¹⁴C-CO₂ extraction module that will allow us to measure radiocarbon at the new state-of-the-art Accelerator Mass Spectrometer facility at the University of Bristol. You will work with the Met Office to develop a model of ¹⁴C-CO₂ in the atmosphere and use this model to examine the influence of nuclear facilities on atmospheric ¹⁴C measurements and determine UK greenhouse gas emissions using new statistical techniques.

