

4 September 2020

Impact of the ocean skin layer on greenhouse gas exchange in the ocean to form major research project

Scientists are to examine the critical role of the world's oceans in absorbing and releasing greenhouse gasses.

Oceans are a global reservoir of greenhouse gases, estimated to account for 20–40% of the post-industrial sink for anthropogenic carbon dioxide (CO₂). However, quantifying the exchange of gases such as CO₂, methane (CH₄), and nitrous oxide (N₂O) between the ocean and atmosphere is a major challenge.

In a major new five-year project, Dr Ryan Pereira from the Lyell Centre, is to lead a new interdisciplinary research group to investigate the role of oceanic 'skin layer' that modulates this exchange. Organic substances, known as surfactants, accumulate in this surface layer and are derived from terrestrial and marine sources, and undergo transformations during transport in water. Understanding how the ocean's organic skin layer modulates this exchange is critical to estimate how the ocean acts as a greenhouse source or sink under changing climate scenarios.

To help overcome this, Dr Pereira has been awarded a £1.6m Starting Grant by the European Research Council (ERC) to spearhead a project that will study organic substances in the ocean skin in the Atlantic Ocean in a transect that spans from South America to Africa.

Dr Pereira says: "The Ocean is a natural sink for CO₂ and other climate gasses. If you want to know how much it can store, you first need to know the rate it transitions from the atmosphere into the oceans and back. At present, there is a large uncertainty on this rate of gas transfer that impacts our ability to estimate, how much carbon might be absorbed and released by the ocean both now and in the future."

The project brings together expertise in atmospheric, and fresh and marine water sciences to identify the main sources of organic substances that influence gas exchange at the water surface. This requires an extensive field programme with expeditions to Guyana, the Cape Verde Islands, and multiple research cruises supported by national and international partners.

Dr Pereira continues: "This award allows for continued investment into the Lyell Centre laboratories of the Carbon-Water Dynamics team with new world-leading facilities that will further interrogate organic substances that will offer new insights into understanding how fundamental biogeochemical cycles, such as the carbon cycle, operate".

The project, named 'Breathing Oceans: understanding the organic skin that modulates the exchange of greenhouse gasses between the atmosphere and the ocean (BOOGIE)', is expected to begin in February 2021.

Ends

Notes to editors:**The Lyell Centre:**

The Lyell Centre is a strategic partnership between Heriot-Watt/the University and the British Geological Survey, funded by the Natural Environment Research Council (NERC), the Scottish Funding Council and Heriot-Watt University. The partnership enables them to work together combining their expertise in geoscience. Exploring themes ranging from geology and geophysics to marine ecosystems, the centre's combination of pure and applied expertise employs innovative methods and technologies to society's most important environmental science and energy challenges.