Oceans may become a less efficient carbon sink

April 30 2021

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The world's oceans could soak up less carbon or even beginning emitting carbon in the future, a new UNESCO report warns.

Oceans are a vital carbon "sink"—without such natural sinks atmospheric carbon levels would now be close to 600 parts per million (ppm), almost 50% higher than the 410 ppm recorded in 2019.

The report brings together the latest knowledge on the oceans' role in the carbon cycle, and aims to provide decision-makers with the information needed to develop climate change mitigation and adaptation policies for the coming decade.

Published by UNESCO's Intergovernmental Oceanographic Commission (IOC), the report comes from an international team including three lead authors from the University of Exeter.

Professor Andrew Watson, of Exeter's Global Systems Institute, said: "If, as we hope, we approach net zero later in this century, it's possible that some of the carbon dioxide that the ocean previously has absorbed from the atmosphere will start to be released again.

"We don't at this stage know how serious that could be."

An environmental monitoring satellite is launched into a polar orbit. Credit: S. Corvaja, European Space Agency

Dr. Jamie Shutler, based at the University of Exeter's Penryn Campus in Cornwall, added: "Satellites, machine learning and automated measurement systems, including ship underway systems and surface drones, play a critical role in quantifying the carbon in our oceans."

Dr. Ute Schuster, of the University of Exeter, said: "Numerical models cannot realistically reproduce the ocean carbon cycle, and since the role of the ocean to mitigate climate change impacts will continue to change in ways that we cannot predict, we need globally coordinated in situ observations, with sustained long-term financial support.

"This report outlines the underlying rationale for the design, and following implementation, of such an efficient and sustained integrated observational network."

The report highlights the role of the ocean since the Industrial Revolution as a sink for carbon generated by human activity.

It examines available observations and research to determine whether the oceans will continue to absorb carbon, or could one day begin to emit some of the carbon that they store.

In developing the report, the IOC brought together experts from the fiveinternational research and coordination programs on ocean-climate interaction, which have been working together since 2018 in the IOC Working Group on Integrated Ocean Carbon Research (IOC-R).

Together they propose an innovative program of medium- and long-term integrated ocean carbon research to fill the gaps in this field.

The report was developed as part of the ongoing UN Decade of Ocean Sciences for Sustainable Development (2021-2030).

Audrey Azoulay, Director-General of UNESCO, said this is "a unique opportunity to bring together all stakeholders around common scientific priorities to strengthen action on the changing ocean carbon cycle."

More information: Integrated Ocean Carbon Research: A Summary of Ocean Carbon Knowledge and a Vision for Coordinated Ocean Carbon Research and Observations for the Next Decade. unesdoc.unesco.org/ark:/48223/pf0000376708

Provided by University of Exeter