



Let's talk about Ocean & Climate

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📍 Inspire Area – European Digital Ocean Pavilion

🌐 United Nations Ocean Conference 2025

Abstract

Aquatic Deoxygenation as a Planetary Boundary

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In an epoch dominated by human activities, Planetary Boundaries have emerged as a powerful overarching framework for tracking global environmental change. Defining a “safe operating space for humanity”, the original Planetary Boundary Framework (PBF) outlines nine key Earth-system processes, as well as their associated thresholds and control variables. However, though more than 70% of the Earth’s surface is covered by water, just three of the original boundaries apply directly to marine and freshwater systems. Moreover, one key impact of climate change has so far been left out of the PBF: Aquatic Deoxygenation.

Aquatic Deoxygenation refers to the global loss of dissolved oxygen in aquatic environments and, like Ocean Acidification, is a global-scale and highly detrimental consequence of human disruptions to our climate system. Globally, oxygen content has declined precipitously across aquatic ecosystems over the last half century, and this trend is projected to continue in the future. Aquatic deoxygenation functions as an integral Planetary Boundary, linking terrestrial, aquatic and atmospheric systems. It spans broad spatial and temporal scales, interacts with all other Planetary Boundaries, and has the capacity to cause global biological crises. By adding Aquatic Deoxygenation to the PBF, we will better protect ecosystems, sustain economies, and build a more resilient and sustainable Earth-system.

