OOS2025-477, updated on 23 Apr 2025
https://doi.org/10.5194/oos2025-477
One Ocean Science Congress 2025

Keeping tabs on ocean alkalinity enhancement: effects of olivine dissolution on the embryonic and larval development of the Pacific oyster Magallana gigas

Cale miller, Hugo Koechlin[2], Luna Ducoulombier[2], Frédéric Gazeau[3], and Fabrice Pernet[2]
[2]Ifremer, Université de Brest, CNRS, IRD, LEMAR, Argenton, France
[3]Sorbonne Université, CNRS, Laboratoire d'Océanographie de Villefranche, Villefranche-sur-Mer, France

Ocean alkalinity enhancement (OAE) aims to increase the CO_2 uptake capacity of the surface ocean by reducing surface water pCO_2 potentially accelerating CO_2 transfer from the atmosphere to the ocean. One such method involves the dissolution of olivine, a naturally occurring silicate mineral, in seawater to sequester excess CO_2. Silicate minerals weather on geological timescales, contributing to the buffering capacity of the ocean, but enhancing this process by adding silicate minerals raises concerns about the potential impact of trace element release from mineral impurities on sensitive marine organisms. In this study we exposed the commercially important Pacific oyster *Magallana gigas* during critical embryonic and larval development to enhanced alkaline waters derived from olivine dissolution. Two experiments were conducted: (1) batch experiments on embryonic development over a gradient of increasing alkaline water from ambient (2300 µmol kg^{-1}) to 11000 µmol kg^{-1}, and (2) a short-term larval experiment from 48 h post-fertilization to 144 h followed by a 15-day recovery period until settlement. For the first time we report that embryonic development collapsed at alkalinity levels above 3500 µmol kg^{-1} and that larval development was delayed. These findings underscore the need for caution in deploying ocean alkalinity enhancement as a geoengineering strategy.