

Ocean Alkalinity Enhancement – a Biological Perspective

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Following recommendations of the 2022 NASEM report, marine carbon dioxide removal (mCDR) research has focused on addressing important questions to gain knowledge before contemplating deployment of technology. These include mCDR potential, durability of carbon dioxide removal and storage, financial costs, and environmental safety. While no mCDR approach is ready for deployment because of gaps in scientific and engineering knowledge, one of the most promising methods, ocean alkalinity enhancement (OAE), has advanced the field by producing important results, largely on phytoplankton but also on metazoan metabolism and carbon physiology. While some results of these studies, mostly using air-equilibrated conditions under a range of pH values within natural pH variability, revealed some shifts in physiology or diversity, the main conclusions of these studies appear to suggest that OAE impacts are unimportant. As companies and investors are moving forward with the development of mCDR, minimizing risks to ocean health and the welfare of peoples that depend on it, and maintaining or improving food security, attention should be paid to functional properties of marine ecosystems including reproductive success, taxonomic and functional diversity, and evolutionary trends. This talk will address important biological questions that must be confronted before upscaling of technology can be considered.