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# The Ocean's Alkalinity: Connecting geological and metabolic processes and time-scales

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The project addresses the role of oceans as regulators of atmospheric carbon dioxide ($CO_2$), thus making a crucial contribution to maintaining climate on Earth in a habitable range. This regulatory function is biogeochemically performed by the ocean's $CO_2$ and pH buffer capacity: alkalinity. Alkalinity is generated by rock weathering, and by natural and human-induced anaerobic processes in sediments of coastal seas. The processes in coastal seas are related to eutrophication such that enhanced nutrient runoff increases alkalinity generation and the risk of deoxygenation and acidification. Climate change and its mitigation both have the potential to perturb the long term stability of the ocean's alkalinity: ice traction will expose rock surface, hitherto covered, to weathering and erosion. Attempts to mitigate and lower atmospheric $CO_2$ levels will necessarily involve the use bioenergy to a large extent, which turn comes with the need to massively employ fertilizers and its consequence: eutrophication and potentially alkalinization of coastal seas. Research will investigate in which measure and to which extent human activities and climate change affect the ocean's alkalinity, particularly the impact of nitrogen fertilizers on coastal seas including the subsequent risk of acidification and deoxygenation. The project will be carried out collaboratively with the Universities of Oldenburg, Hamburg and Exeter (UK), and the Alfred-Wegener- Institute for Polar and Sea Research.