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ACIDIFICATION OF THE MARINE NITROGEN CYCLE

Predicted changes to ocean carbonate chemistry are likely to affect processes and organisms which contribute to the marine nitrogen cycle though we are at an early stage in our understanding and impacts are largely uncharacterised. Ocean Acidification manipulation experiments have been performed in a range of environments from the oligotrophic Mediterranean (MedSeA) to the ice-edge of the summer Arctic and Antarctic Oceans (UKOA). During mesocosm experiments off Corsica and Villefranche, nitrate uptake and nitrification in perturbed environments (6 x CO₂ enrichments up to 1290 µatm) did not differ from controls, in contrast the summertime rates of nitrogen fixation were seen to increase approximately 10 fold when pH levels were in the order of the predicted 100 year scenario. Similar to our findings in Mediterranean mesocosms but in contrast to other published work, nitrification in surface waters of temperate European seas and the Arctic Ocean proved resilient to all OA manipulations (3 x CO₂ enrichments up to 1000 µatm). We are awaiting the results of nitrification experiments performed at the base of the photic zone in Arctic and Antarctic waters with baited breath as N₂O production proved to be progressively inhibited with increasing levels of CO₂. These data are presented in the context of other published work in order to appraise the current understanding of the pelagic nitrogen cycle in a high CO₂ environment.