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Physics vs. biology: carbon fluxes on the Northwest-European Shelf and within the North Sea

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A 3D-biogeochemical model describing the inorganic and organic carbon cycle as well as the nitrogen and oxygen dynamics is applied to the region of the Northwest-European Shelf for the year 1995.

For the inner shelf area, the North Sea, the carbon budget reveals a net uptake of 200 Gmol C yr^{-1} of atmospheric carbon dioxide which is effectively exported into the North Atlantic. In order to discriminate the physically induced carbon fluxes from those which were additionally induced by biological activity an alternative scenario was performed without biological activity. In this scenario the summer outgassing prevailed over the winter uptake of atmospheric CO_2 and resulted in 284 Gmol C yr^{-1} leaving the North Sea via air-sea exchange. That allows the conclusion that the biological carbon pump has a strength of 484 Gmol C yr^{-1}.