



## **Nitrification and the fate of the f-ratio**

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The inventory of carbon dioxide in the ocean is controlled by both physico-chemical and biological mechanisms. The latter relates primarily to the sinking (or export) flux of organic material produced by biological activity in the surface euphotic zone. As this flux is unwieldy to directly measure, proxies are often used to estimate it. One of these is the f-ratio. This centres on the uptake ratio of nitrate to ammonium by phytoplankton, and makes a key assumption regarding the origin of these nitrogen species: while ammonium is produced by recycling at the ocean's surface, nitrate is only nitrified (regenerated) at depth. Consequently, primary production fuelled by it indicates resupply from depth and, thus, export to depth (at equilibrium). However, recent observational work finds the nitrification to nitrate occurring throughout the water column. The consequences for the f-ratio are examined here in a medium resolution (1 degree x 1 degree) ocean GCM, OCCAM. A simple NPZDA ecosystem model is used, with the fate of both shallow- and deep-regenerated nitrate audited to examine what the f-ratio is really estimating.