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# Phytoplanktonic primary production in a nutrient-rich estuary - comparison of methods

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Phytoplanktonic primary production was investigated in the turbid and nutrient-rich Scheldt estuary (Belgium/The Netherlands) during two field trips in November 2002 and April 2003 (EUROTROPH project). Three common incubation methods for estimating primary production in aquatic ecosystems were used and compared: (1) the light-dark oxygen, (2) the 14C and (3) the H218O approaches. Four and five stations along the estuary were sampled in November and April, respectively, which corresponded to a salinity range of 0.5-21. Water was sampled at sunrise and incubated until sunset in bottles stored in a 5-compartment incubator kept at in situ temperature by flowing estuarine water. Irradiance was controlled in each compartment by filters having a shading capacity ranging from 0 to 100%. The contributions of oxygen consumption due to respiration and nitrification, were estimated by incubating samples in the dark compartment, with and without addition of nitrification inhibitors. Unexpectedly, the H218O method provided lower gross primary production rates than the oxygen technique. Rates estimated by the 14C approach were intermediate between these two. Ratios of O2 vs. 14C based rates were in the range of reported ratios in estuaries (1-1.7) indicating that the 14C method provided estimates close to gross primary production. The ratio of O2 vs. H218O based rates varied between 1 and 4 with the highest values estimated for oligohaline stations. Interestingly, these ratios were strongly correlated with the nitrification rates. Although the reasons of such an impact of nitrification on 18O remain unknown, this study clearly highlights the potential underestimation of gross primary production by the H218O method in ammonium-rich systems.