



## **Production of dissolved organic matter by phytoplankton and its uptake by heterotrophic prokaryotes in large tropical lakes**

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In pelagic ecosystems, phytoplankton extracellular release (ER) can substantially subsidize the heterotrophic prokaryotic carbon demand. Factors influencing ER were never investigated in large tropical lakes. We performed time-course experiments to quantify the fraction of phytoplankton production released (PER) and the microbial uptake of freshly excreted compounds (DOCp) in 4 large tropical lakes: lakes Kivu, Edward, Victoria and Albert. In Lake Kivu, we also examined whether the major heterotrophic bacterial group were active in the uptake of freshly excreted compounds using MAR-FISH (microautoradiography coupled to fluorescent in situ hybridization). PER varied across a productivity gradient covering 2 orders of magnitude, with higher values at low productivity. Furthermore, PER was comparatively higher in oligotrophic tropical lakes than in their temperate counterparts and was positively related to the light:phosphate balance. Both observations suggest that environmental factors play a key role in the control of phytoplankton excretion. Furthermore, the standing stocks of DOCp were small and generally contributed less than 1 % to the total dissolved organic carbon as it was rapidly assimilated by prokaryotes, in other words we observed a tight coupling between the production and the heterotrophic consumption of DOCp. We found that none of the major phylogenetic bacterial groups investigated differed in their ability to take up DOCp, in contrast with earlier results reported for standard labelled single-molecule substrates (leucine, glucose, ATP). Overall, these results highlight the strong dependence of all heterotrophic prokaryotes on the labile pool of DOCp, and the importance of carbon transfer between phytoplankton and heterotrophic prokaryotes in large African lakes.