



The metabolic balance of the planktonic community in the North Atlantic Subtropical Gyre: The role of mesoscale instabilities

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ABSTRACT: We have studied the net community production (NCP) balance in the Eastern region of the Subtropical North Atlantic during two cruises, in August 1998 and April 1999. In August, heterotrophic bacteria were more abundant than picophytoplankton, which resulted in net heterotrophy (NCP = $-129 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1} \pm 18$; mean \pm SE), whereas these differences in plankton components were not apparent in April 1999, when the community was in metabolic balance (NCP = $-13 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1} \pm 19$). In April, the metabolic balance of microplankton communities was net heterotrophic outside (NCP = $-57 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1} \pm 26$) and lower than inside (NCP = $19 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1} \pm 19$) the mesoscale structures present in the area (subtropical front, cyclonic eddy Leticia, and the Great Meteor Tablemount). Positive NCP inside the cyclonic eddy (NCP = $20 \text{ mmol O}_2 \text{ m}^{-2} \text{ d}^{-1} \pm 17$) was due to lower respiration rather than to higher gross primary production rates. Gross extrapolation suggests that the regional organic carbon deficit within the Eastern Subtropical Gyre ($0.98\text{-}1.88 \text{ Gt C yr}^{-1}$) should increase by $\sim 14\%$ and 52% in the absence of mesoscale structures.

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