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Prokaryotic respiration and production in the meso- and bathypelagic realm of the eastern and western North Atlantic basin

Reinthaler, Thomas, Hendrik van Aken, Cornelis Veth, Javier Arístegui, Carol Robinson, Peter J. le B. Williams, Philippe Lebaron, Gerhard J. Herndl

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ABSTRACT: We measured prokaryotic production and respiration in the major water masses of the North Atlantic down to a depth of ~4,000 m by following the progression of the two branches of North Atlantic Deep Water (NADW) in the oceanic conveyor belt. Prokaryotic abundance decreased exponentially with depth from 3 to 0.4 x 10° cells mL° in the eastern basin and from 3.6 to 0.3 × 10° cells mL° in the western basin. Prokaryotic production measured via ³H-leucine incorporation showed a similar pattern to that of prokaryotic abundance and decreased with depth from 9.2 to 1.1 μmol C m<sup>3</sup> d<sup>3</sup> in the eastern and from 20.6 to 1.2 μmol C m<sup>3</sup> d<sup>3</sup> in the western basin. Prokaryotic respiration, measured via oxygen consumption, ranged from about 300 to 60 μmol C m<sup>-3</sup> d<sup>-1</sup> from ~100 m depth to the NADW. Prokaryotic growth efficiencies of ~2% in the deep waters (depth range 1,200-4,000 m) indicate that the prokaryotic carbon demand exceeds dissolved organic matter input and surface primary production by 2 orders of magnitude. Cellspecific prokaryotic production was rather constant throughout the water column, ranging from 15 to 32 x 10° fmol C cell" d" in the eastern and from 35 to 58 x 10° fmol C cell" d" in the western basin. Along with increasing cell-specific respiration towards the deep water masses and the relatively short turnover time of the prokaryotic community in the dark ocean (34-54 d), prokaryotic activity in the meso- and bathypelagic North Atlantic might be higher than previously assumed.

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