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Reduced prokaryotic heterotrophic production at *in situ* pressure conditions in the dark ocean

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Prokaryotic heterotrophic production (PHP) is a key process in the ocean's biological carbon cycle. About 50% of the oceanic PHP takes place in the dark ocean characterized by low temperature and high hydrostatic pressure, which increases by 1 MPa (10 atm) every 100 m depth. However, rate measurements of PHP are usually performed under atmospheric pressure conditions. Yet, the difference in pressure conditions and the handling of the samples on board may introduce biases in the PHP measurements.

To determine PHP at *in situ* conditions, we developed an *in situ* microbial incubator (ISMI) designed to autonomously sample and incubate seawater down to a depth of 4000 m. Natural prokaryotic communities from the North Atlantic and Pacific Oceans were incubated in the ISMI with 5 nM ^{3}H-leucine at different depths ranging between 10 and 3200 m. For comparison, atmospheric pressure incubations at *in situ* temperature were also conducted. PHP and single cell activity assessed by microautoradiography combined with catalyzed reporter deposition fluorescence *in situ* hybridization (MICRO-CARD-FISH) were determined.

PHP obtained under *in situ* pressure conditions was generally lower than under atmospheric pressure conditions, suggesting that incubation under atmospheric pressure on board stimulates activity of dark ocean prokaryotes. The ratio between the bulk PHP obtained under *in situ* and under atmospheric pressure conditions decreased with depth. Moreover, MICRO-CARD-FISH revealed that some specific prokaryotic groups are apparently more affected by the hydrostatic pressure condition than others. Our results suggest that PHP in the dark ocean might be lower than assumed based on measurements under surface pressure conditions.