

Towards an improved mechanistic model of microbial degradation of sinking marine particles

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Earth system models estimate that around 10 billion tonnes of Particulate Organic Carbon (POC) sink out the upper ocean annually. The Regional Carbon Cycle and Processes study (RECCAP2) recently reported that 9 billion tonnes of this settling POC is transformed to dissolved carbon by 1 km depth. As a community, our research focusses almost exclusively on what remains – the particles, and typically we refer to this massive particle transformation as particle breakdown, or degradation or remineralization. In this presentation, I will present data on vertical changes in the apparent respiratory quotient of sinking particles. I will contextualise these findings using C-RESPIRE (see Boyd et al., 2015, L&O Methods) particle interceptor/incubator data from the upper mesopelagic to explore what sets the limits on particle degradation by attached microbes. I will use these findings along with the diverse particle transformation and microbial literature to develop an improved model of how microbes degrade particles in the oceans' Twilight Zone.