

Interactive comment on “Changes in the spectrum and rates of extracellular enzyme activities in seawater following aggregate formation” by K. Ziervogel et al.

Anonymous Referee #1

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This paper provides interesting and important new information on how marine aggregates impact hydrolysis processes in the sea and potentially influence the ability of microbial communities to utilize organic carbon. Comparisons are made between identical samples, one where particles have been artificially aggregated, and one where they remain dispersed. The results show that laminarin and xylan-hydrolyzing enzymes were enhanced in aggregates, and there was an associated increase in the activity of free-living bacteria in the surrounding seawater. Several other enzymes showed decreased activity in the free-living fraction. Clearly, nature is complex and the authors provide extensive and insightful discussion regarding these complexities. There is relatively little literature on the activities of extracellular enzymes by marine snow-

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associated microbes and to my knowledge, this is the first to use natural particles rather than substrate proxies.

The methods used here to form aggregates have been extensively used by other researchers and are well regarded. The total aggregate abundances generated ($< 0.05\%$ of the total seawater volume) are realistic for coastal areas making the results quite applicable to the real world. The figures and Table are clear and well laid out.

I have only one concern. The methods are not complete. It is not clear how the aggregate dry weight was determined. Were individual aggregates removed from the cylinders and weighed? Or were all the aggregates collected on a filter and volume assessed (from the weight to volume relationship mentioned) as if they were one big particle? How fast were the cylinders rotated? (More rapid rotation could produce more densely packed aggregates). What were the approximate sizes and numbers of aggregates produced in each rolling cylinder and how did their sizes compare to those of the microaggregates and phytoplankton from which they were most likely composed? This information would better allow comparison to natural aggregates. The standard deviations in Fig 1 are quite reasonable, suggesting that the 15 ml sample sizes were large enough to include the range of dispersed particles in the unrotated seawater but perhaps this needs to be pointed out to strengthen the choice of this relatively small sample size, especially for whole seawater. There needs to be more detail added to the methods to cover these points.

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