Ocean Science Discussions, 1, S22–S25, 2004
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European Geosciences Union

Ocean Science Discussions

Interactive comment on "Reality checks on microbial food web interactions in dilution experiments: Responses to the comments of Dolan and McKeon" *by* M. R. Landry and A. Calbet

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Received and published: 17 January 2005

One might question, with good reason, the interest of this exchange concerning estimates of grazing on phytoplankton derived from dilution experiments. The manuscript criticizing the method was announced via e-mail to about 85 authors of papers reporting the results of such experiments. The message apparently reached about 75 researchers since 10 messages were returned. Out of the 75 recipients, 3 sent an e-mail promising to read the manuscript. A repeat mailing 4 weeks later resulted in 3 responses. Not one of the authors of papers reporting the results of dilution experiments sent a comment to the journal. Nonetheless, below is response to the statement of Landry and Calbet.

Our manuscript (Dolan & McKeon 2004) set out to accomplish a very specific task: call into question a widely-used method which appears to receive little critical examination. As evidence consider citation data of the original paper describing the method, Landry & Hassett 1982, as compared to 3 papers pointing out problems with the method: Gallegos 1989, Evans and Paranjape 1992 and Dolan et al 2000. Based on ISI citation data on papers published from 2001 to 2004, 102 cited the Landry and Hassett method paper compared to 30 citations for the Gallegos paper, 7 citations of Evans & Paranjape and 19 for the Dolan et al. report. These citation rates suggest that less than 1/3 or, 1/11, of the researchers reporting results of dilution experiments were either aware of, or willing to acknowledge possible problems with the method.

Of course, one possibility is that there is no problem with the method and consequently the data which result. Landry and Calbet defend this position contending that our critique 'goes wrong' because 1) the grazing community in oligotrophic waters are clearly different from coastal systems, 2) data from FLB disappearance experiments support dilution grazing rate data, 3) flagellates are the dominant grazers in oligotrophic systems and flagellates have growth and mortality dynamics distinct from those of ciliates. I believe there is little evidence to support these contentions.

With regard to the first assertion, to my knowledge, there is no data showing that oligotrophic communities have micro and nanozooplankton communities which are consistently different from coastal communities. Other than a variable presence of heterotrophic dinoflagellates, I know of no reason to assert this. Indeed, data shown in Fig. 3 of Dolan & McKeon suggest that lot of variability can be shown but no trends.

The second contention: Landry and co-workers attempted to bolster credibility in the method by examining bactivory using the FLB disappearance rates in a set of dilution experiments (Landry et al. 1995). In a set of 5 experiments, pooled data showed a correlation between 'dilution factor' and disappearance rates of picoplankton prey analogs. The apparent growth of phytoplankton was then computed using both dilution factor and 'relative to whole water' FLB disappearance rates. The data showed that

OSD

1, S22–S25, 2004

FLB disappearance rates were relatable to phytoplankton growth rates. However the relevance to in situ conditions is less than clear as the experiment involved nutrient additions. Dilution cultures were proposed some time ago as a means of estimating bacterial growth rates in situ (Kirchman et al. 1982). However it is now widely recognized that even without adding nutrients, changes in growth rates and community composition occur, triggered by the diminished competition for nutrients, rather than reduced predation (Fuchs et al. 2000). It is thus hazardous to extrapolate results from experiments with added nutrient to in situ conditions.

The third contention that nanoflagellates have numerical responses different from ciliates lacks evidence. Furthermore, nanoflagellates in oligotrophic systems would need to be not only starvation resistant but would also have to be characterized by very high clearance rates if, as Landry and Calbet contend, they are the major grazers. Existing evidence, while sparse, suggests that clearance rates of flagellates from oligotrophic systems have clearance rates about the same as those from coastal systems (Christaki et al. 2001). As overly simplistic and obvious it might be, it appears necessary that we re-iterate our major conclusion: it would appear prudent to quantify grazers when performing grazing experiments.

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Interactive comment on Ocean Science Discussions, 1, 65, 2004.