

Interactive comment on “Seasonal and latitudinal patterns of pelagic community metabolism in surface waters of the Atlantic Ocean” by S. Agusti

P. Williams (Referee)

pjlw@bangor.ac.uk

Received and published: 20 February 2012

The author has analysed measurements of NCP/GPP/Resp from a single depth from four N-S/S-N Spanish cruises in the Atlantic for the latitudinal seasonality of these above features of the plankton. This type of study, which takes advantage of the N/S runs of the Antarctic supply cruises, was pioneered by Pablo Serret and Carol Robinson. To my mind the research activities of the two groups complement one another, although the present author has, as far as I can see, makes little attempt to take advantage of this – which is a serious omission. There is a rather unconvincing justification for this (p.512 line 25 to page 513 line 2) “Here, variability was also observed in the temperate waters sampled, as described in other studies (e.g. Gonzalez et al., 2002), but the variability in the intertropical boundaries was identified here because the study

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included inter-annual data, and a more detailed sampling spatial resolution than previous studies (e.g. Robinson et al., 2002; Serret et al., 2002, 2006; Gonzalez et al., 2002), as the effort was done at a single layer.” Now the present Latitude 1 apparently comprised 34 stations, the other three cruises 10-13 stations, all at a single depth, giving 67 sets of observations in all. Whereas the AMT cruises sampled 24 stations and in AMT 6 apparently 9-12 depths amassing a data base of some 700 observations – some 10-fold greater. Thus the latter is a substantial and relevant resource, which in my experience, is readily available from the British Oceanographic Data Centre and a Web Site maintained by Carol Robinson. In relation to this, two significant and relevant papers that derive from the AMT study has not been considered (Gist et al (2009) Seasonal and spatial variability in plankton production and respiration in the Subtropical Gyres of the Atlantic Ocean. Deep-Sea Research II. 56 931-940; Serret et al (2009) Predicting plankton net community production in the Atlantic Ocean. Deep-Sea Research II. 56 941–953) There are other papers, that perhaps are not so directly relevant, that have also not been discussed (Serret et al (2001) Latitudinal variation of the balance between plankton photosynthesis and respiration in the eastern Atlantic Ocean. Limnol. Oceanogr., 46(7), 1642–1652; Arístegui & Harrison (2002) Decoupling of primary production and community respiration in the ocean: implications for regional carbon studies. Aquat Microb Ecol. 29: 199–209)

Figure 5 illustrates that the whole latitudinal sector from 30N to 40S must be, in the balance, net heterotrophic – just reaching balance at times - that’s the conclusion we draw from the fitted line. As this paper only has data from one depth it is not possible to determine the scale of the imbalance but it will call for a substantial input of organic material to feed the deficit. Whereas in the discussion the author considers the dynamics of the plankton in some detail I can find no discussion of how these inputs needed to sustain the heterotrophy come about. That this is left hanging is a serious omission to me.

There is a statement in the Introduction (p.508, line,14) “Consumption should exceed

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respiration in unproductive areas . . . “, it may be choice of word but I would contest the word “should” as it’s not a given to my mind. Agreed it is observed in in vitro studies, but it is not seen in in situ studies. Thus, I think “has been observed” is more appropriate than “should”

With these various above omissions, I think at this stage the author should be asked to rewrite the paper taking the recent omitted work into consideration and her findings in relation these published findings. Then we’ll have a better idea whether her claim in the Abstract (last line) :” The results showed new spatial and temporal patterns in the pelagic metabolic balance of the surface Atlantic Ocean with consequences for the carbon flux.” is merited. We also need some consideration what drives the heterotrophy — I don’t think you can use the threshold argument as an explanation as it is circular. In essence, heterotrophy has to be driven externally – the community cannot pull in the organic deficit.

Interactive comment on Biogeosciences Discuss., 9, 507, 2012.

BGD

9, C146–C148, 2012

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