

Interactive comment on “Phytoplankton distribution and nitrogen dynamics in the Southwest Indian subtropical gyre and Southern Ocean Waters” by S. J. Thomalla et al.

Anonymous Referee #3

Received and published: 13 October 2010

Scientific Significance:

This manuscript presents an important dataset from the significantly under-sampled southern Indian Ocean/Southern Ocean. Several important parameters were measured including nutrient uptake rates (and f-ratios), size-fractionated chlorophyll-a, hydrology and nutrient concentrations. The sparsity of such datasets alone warrants publication of this manuscript.

Scientific Quality:

The quality of analysis is generally good, the writing style *per se* is very accessible. I suggest one additional (sub-) figure and editing of the manuscript mostly for brevity.

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If possible, the results and discussion sections should be merged. As it stands, the results section is verbose and makes the paper very long - the figures speak for themselves and do not require a blow-by-blow account of e.g. chlorophyll dynamics. Results sections 3.3 [par 1-2], 3.4 [par 1, 3], 3.5 [par 1], 3.6.4 [par 1, 2], 3.6.5 [par 1] already resemble 'Results & Discussion'.

Presentation Quality:

Good writing style, clear figures and tables.

COMMENTS:

1. The results section is somewhat verbose and should be either shortened or merged fully into 'Results & Discussion'.
2. Sections 3.3, 4.2 and 4.3 include discussion of biogeochemical parameters in respect of stratification but referring only temperature profiles. These arguments would be greatly strengthened by using buoyancy frequency, preferably shown as separate temperature and salinity contributions to the buoyancy frequency (see e.g. Gill, Physical Oceanography), or density sections. I recommend inclusion of N^2_T and N^2_S sections in an additional figure or as an extra 2 panels in figure 3. The sections mentioned may then require revision.
3. When discussing chlorophyll concentration in the various water masses, it should be stressed that the water mass classification adopted here refers to conditions at 200 m depth. Because of the marked longitudinal depth gradients, conditions at 200 m are not the same as conditions at the surface. This should be considered, particularly in section 4.3.1 - Subtropical Front lines 10 - 15.
4. Clearly the fieldwork undertaken here is insufficient on its own to account for the nutrient and growth dynamics across the sample region. Some suggestion as to what is still lacking in terms of parameters and temporal coverage, or modelling, that would enable these processes to be more fully explained, would be useful.

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MINOR COMMENTS:

- pg 1354 add a reference for 1% light level (e.g. Kirk, Light & Photosynthesis in Aquatic Ecosystems)
- pg 1354 line 6: was microscopy used to check that no large diatoms were retained on the zooplankton filter?
- pg 1367 line 12: please add equation for RPI.
- pg 1372 last paragraph: If the STF northward migration is accounted for by the physical motion of the eddy, wouldn't the phytoplankton population be advected with the front? In that case, the senescent bloom would still be found at the STF location on the southward transect.
- pg 1374 lines 24-25: Since no CO₂ budget measurements were made, state ~'probably' instead of 'are' and 'is'.
- figure 11: scales for the f-ratio subplots are unclear: are the log or linear? I can't tell whether the third x-axis tick label is 1.0 or 10.

Interactive comment on Ocean Sci. Discuss., 7, 1347, 2010.

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