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Biogeosciences Discussions
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Interactive comment on "Origin and fate of particulate and dissolved organic matter in a naturally iron-fertilized region of the Southern Ocean" *by* L. Tremblay et al.

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A. General comments

Southern Ocean plays an important role to CO2 sequestration, while it is considered as one the largest HNLC oceanic regimes. Although several studies and many international projects have been undertaken in the Southern Indian Ocean very few accessed the dynamics of DOM and POM at the molecular level in relation with bacterial degradation. The authors present an extremely valuable dataset on the distribution of amino acids in POM and DOM in 5 representative stations of the Southern Ocean around the Kerguelen plateau. AA were used to assess the origin and fate of POM and DOM and

the authors speculate about the mechanisms regarding the slower degradation of the organic matter in the HNLC waters. The whole discussion is well supported by the data and this study is a nice contribution to the field of marine biogeochemistry. Below are some minor comments that will help the authors to improve their MS.

B. Minor comments

(1) Abstract line 12. .... and other markers revealed that.... Which other markers do you mean? Be more specific.

(2) Introduction, line 7. , the largest HNLC ocean. I would change this as : ....., the largest HNLC oceanic regime.

(3) Introduction, line 30. .....at ambient concentrations and provide numerous indicators on OM origin. I would change this as:..... and may provide wealthy information....

(4) Materials & Methods. I would advise the authors to give a figure with the sampling stations because in Blain et al., 2014 paper there are several sampling stations from transects during the cruise and it is not easy for the reader to locate quickly the sites of sampling.

(5) Discussion. 4.1 Amino acids in the Southern Ocean. The authors can include in the reference list the following papers : Shen et al. 2012; Biogeosciences 9: 4993-5005. Distribution of AA in DOM in the Beaufort Sea (Arctic Ocean). Panagiotopoulos et al. 2002. Org. geochem. 33: 985-1000. Bulk AA in POM in the polar front zone (Southern Ocean)

(6) Origin and fate of POM, line 10-15 page 14114. I am sceptical with the idea that you explain POM export during the bloom when you sampled POM with Niskin bottles and not with sediment traps.

(7) Fig.5. It will be really interesting if you can include in this Figure AA data (if you have any) from diatoms (phaeocycstis) or autotrophic bacteria (Synechococcus) from

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the sampling stations. Diatoms or coccoliths from other studies -I do not know if it does make any sense- are simply indicative of AA composition.

(8) Discussion. Line 23 page 14114; line 15 page 14115. The term refractory should be used with great caution. It is hard for me to believe that D-AA are refractory simply because they come from living organisms such as bacteria. The term "refractory" should be accompanied with Δ14C measurements. In my knowledge there are not yet Δ14C measurements on individual D-AA (compound specific radiocarbon analysis) and therefore I would avoid using this term. You can use instead the term, less degradable compounds, less labile compounds etc. A compound that is not easily degradable, this does not imply that it is necessarily refractory.

Interactive comment on Biogeosciences Discuss., 11, 14097, 2014.