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Interactive comment on "Absorption and fluorescence properties of the eastern Bering Sea in the summer with special reference to the influence of a Cold Pool" *by* E. J. D'Sa et al.

Anonymous Referee #2

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The study explores the potential of optical properties as an indicator for dissolved organic matter sources and transformations in the Bering Sea by relating a variety of absorbance and fluorescence based parameters to hydrography and biological indicators. The methods used in this study are appropriate and all necessary corrections have been used in order to acquire comparable results to other studies. In general terms the results of this study are very heterogeneous with few consistent patterns throughout the data set. It must have been a difficult data set to work on, but sometimes that is what we have to work with. From my own experience in working in the Arctic regions it has been very helpful to relate chemical parameters to water masses. I am not sure what information the authors can access, but I would suggest to strengthen the portion

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of water mass characterization to see if the relationships to the optical properties become more convincing. The authors mention the cold pool in their study region. Is this cold pool what physical oceanographers call “winter water” produced during the last freezing cycle? If so, I would stick to terminology that is used in this environment. The study would potentially also benefit from including oxygen concentrations, which should be available from an oceanographic data set like the one in this study. If available, stable oxygen isotope values of water would also be a good indicator for water masses in this region and would likely be extremely useful to interpret this heterogeneous data set. The other suggestion I would have is to expand on the observed ranges of optical properties published for the high latitude environments. Spectral slope values for example can vary from 12 to 40 in the Arctic environment, unrelated to photo-bleaching of CDOM but with strong relationships to water masses. There have also been other studies in the Arctic including information about Parallel Factor Analysis components of EEMs that could be related to this data set to identify similarities and differences, see work by Granskog et al. and Walker et al.. In terms of constraining the sources and transformations of organic matter it might be helpful to look at a property-property plot of S and a355nm, this relationship has produced interesting patterns in other studies in the Arctic and might help with the interpretation of this heterogeneous data set. One interesting observation in this study is that absorbance and fluorescence give you a somewhat different picture, particularly in terms of a potential sediment CDOM source. While the fluorescence components are mostly elevated in the lower water column the absorbance based parameters are not. My last general comment would be to try to shorten the manuscript, may be fewer figures and a combined results and discussion section to improve the manuscript flow.

Specific comments: Page 19129, line 11: CDOM loss is not a proxy for DOM loss! Fig. 1: Add (UP region) after Unimak Pass

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Interactive comment on Biogeosciences Discuss., 10, 19109, 2013.