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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biogenic influence on cloud microphysics over the global ocean" *by* A. Lana et al.

Anonymous Referee #1

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Manuscript deals mostly around the so called CLAW hypothesis, which have been under investigation for few decades, and been recently also challenged. The manuscript is well written and in organized logically. The manuscript deals with relationships between satellite retrieved cloud droplet effective radius and various possible sources of CCN; from DMS oxidation, primary organic aerosol (POA), secondary organic aerosol (SOA) precursors and sea salt aerosol. The manuscript output is correlation coefficients between possible and potential sources and cloud droplet effective radius. There is a strong negative correlation between " potential source for CCN-forming DMS oxidation" and cloud droplet effective radius above part of the oceans, most clearly in southern hemisphere between 40ïĆř and 60ïĆř S. There is also correlation between SOA and cloud droplet radius. For POA and sea salt there seems not to be correlation or it is positive. Though for the science the contribution of the manuscript is not

major, the results might be quite interesting after some data processing. This could be published in ACP after revisions.

Major concerns and suggestions:

Even though there is a clear negative correlation between between " potential source for CCN-forming DMS oxidation" and cloud effective radius it does not proof that between " potential source for CCN-forming DMS oxidation" is responsible for seasonal behavior of cloud effective radius. Authors also point this out, though it should come out stronger in the text. There is a long way for " potential source for CCN-forming DMS oxidation" or "SOA flux" to affect cloud properties, though natural biological cycle is similar than annual cycle of effective radius, which can be affected by many factors.

When talking about the indirect effect the liquid water content in clouds should be same in all cases, there is no mentioning about if has this kind of classification has been done for the effective radius data. Also it would be out of interest how cloud optical thickness (which is actually closer to climate effect) is affected by these parameters. There is very little information if there has been any screening of satellite cloud retrievals. Are authors discussing on MBL clouds or all clouds? I think one should make a division between the cases, aerosol having influence on clouds in MBL are most likely different than in free troposphere. More emphasis should be put on the cloud properties, cloud top height and temperature, cloud cover etc..not just effective radius. This might be difficult and require lot of work since one should look into more detailed satellite retrieval data than just monthly or weekly averaged data. However, just to use the current data set is not very satisfying. How would relationships look like if one take for example every January over the period under investigation and compare " potential source for CCN-forming DMS oxidation" or "SOA flux" against cloud droplet, I suppose the other properties affecting to either one would be closer to each other than taking all data into consideration.

The SSflux and POA fluxes do not correlate with cloud droplet effective radius or there

is a positive correlation. Very little discussion is given to this positive correlation, I wonder what are the results if one limits the clouds only to MBL clouds. I wonder what is the main driver in DMS and SOA fluxes. Is it OH, SST, DMS in surface water, wind speed. . . so is one could make this kind of examination against these and cloud properties what would be the correlation coefficients.

For authors the absolute values are not important. At least I would like to see how much cloud droplet effective radius changes with fluxes or with season, at least for the case studies. For case studies I miss also simple flux (MSA) vs. cloud effective radius plots.

Minor comments: page 3657; line 3; concentration number -> number concentration

page 3659; Line 22, reference von Glassow, 2007; I did not find from reference list

page 3661; line 8; definition for SST

page 3662; line 2; raion ? should it be ratio

page 3661; line 3; definition for ks

page 3663; line 25; definition for CHL

page 3665; line 16; Lana et al. 2011c, I do not think one can refer to manuscript “in preparation”

what is the y-axis in figs 2, 3, 4 and 5.

fig 2., in inset there is CHL and in text box SOAf. . ...

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 3655, 2012.