

Interactive comment on “On the role of the seawater absorption to attenuation ratio in the radiance polarization above the Southern Baltic surface” by Włodzimierz Freda et al.

Anonymous Referee #2

Received and published: 8 March 2019

“On the role of seawater absorption to attenuation ratio in the radiance polarization above the Southern Baltic surface” by Włodzimierz Freda, Kamila Haule, and Sławomir Sagan

My review refers to the revised manuscript version from February 26, 2019. This version includes changes in response to the very detailed and competent first review. The suggested additional references have been included. However, at some points I would have wished more discussion with their content. Generally, the discussion comes a bit short and the first reviewer listed many reference points worth to discuss, but not mentioned in the new version (e.g. all comments >#32). I suggest adding some more

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discussion and context of the findings. Specific comments: The used wind speed of 5 m/s is plausible; it's approximately the annual global mean and therefore basis of many ocean colour applications, e.g. atmospheric correction of water algorithms. In contrast, a wind speed of 15 m/s (7Bft) is typically considered as high wind, moderate or near gale, and is of less relevance for remote sensing or in situ measurements. In this case, we would have additional depolarization due to enhanced whitecap fraction (e.g. Hu et al., 2008), air bubble entrainment and possibly more sea spray generation. In the coastal regions of interest, we would not expect fully developed wind seas, but considering the large sun zenith angle of 75° , results based on the Cox-Munk model must be seen very carefully (Mobley, 2015; Hieronymi, 2016). Assuming that the applied Monte Carlo model nevertheless works properly, we will have increased multiple scattering at the sea surface in the winter case with large zenith angle. This can be an important source for depolarization. I find it not helpful to combine the effects of changing IOPs and zenith angle. The main difference in terms of season seems to be the sun zenith angle and not IOPs or ratios. There is also no need to restrict the findings to this particular region (also not in the title). Thus, it is hard to differentiate the individual effects on maximum DoP or polarization pattern.

Hu, Y., Stamnes, K., Vaughan, M., Pelon, J., Weimer, C., Wu, D., ... & Omar, A. (2008). Sea surface wind speed estimation from space-based lidar measurements. *Atmospheric Chemistry and Physics*, 8(13), 3593-3601.

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-127>, 2018.

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