

Interactive comment on “Joint retrieval of aerosol and water-leaving radiance from multi-spectral, multi-angular and polarimetric measurements over ocean” by F. Xu et al.

Anonymous Referee #2

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The paper presents a joint retrieval method for aerosol properties and water-leaving radiance from simulated and real AirMSPI observations. The topic is very interesting and suitable for the journal. However, I think the paper needs improvement mainly due to the presentation, the current paper contains too much details. I would expect that the paper can be much shorter and informative if well-organized. As the authors presented, there are mainly three important aspects highlighted in this paper, they are: (1) A bio-optical model was introduced; (2) Spatial smoothness of aerosol and surface properties were performed (3) A new radiative transfer strategy based on the previous work from the authors, thus those three important aspects should be detailed presented and analyzed. Thus I would like to suggest a major revision. Major comments are

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listed below: (1) The introduction part need to summarize the current status of aerosol remote sensing over ocean with/without polarization (2) A small introduction about the AirMSPI instrument will help reader to understand the sensitivity study and the retrieval results. (3) Section 2.1, 2.3, 2.4 and 2.7 can be shifted to appendix part, the authors should merge and re-organize the radiative transfer strategy and surface-atmospheric coupling sections. Section 2.6 can be merged into section 2.5 and some more details should be included in the sensitivity study part. (4) Section 3.4 should be summarized at the beginning of this section, like a summary of all assumptions of this algorithm. And a comprehensive sensitivity study is necessary for all the important assumptions here. (5) Section 3 should be re-organized as Section 2. (6) The difference (not absolute values) between Extended adding-doubling and SOS is preferable in Fig. 2 (7) P32, Line 13 - 17, P34 Line 13 – 19, this part illustrates the potential coupling effect between retrieved AOD and SSA, some more detailed analysis, like for instance, a sensitivity study for typical cases is necessary (8) P33, Line 4 – 15, all the analysis is for case of AOD larger than 0.3? Please note that the global mean (both land and ocean) AOD is about 0.25, AOD over ocean can be much lower. (9) A RGB map from AirMSPI can be helpful to understand Fig. 12 (10) Section 4.2, comparison between AirMSPI and other instruments like MISR, POLDER will be interesting.

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