

# ***Interactive comment on “Simultaneous determination of aerosol optical thickness and water leaving radiance from multispectral measurements in coastal waters” by Chong Shi and Teruyuki Nakajima***

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The authors present an optimization approach for the simultaneous determination of aerosol optical thickness (AOT) and normalized water leaving radiance ( $nLw$ ) from MODIS. Retrieval of AOT from satellite over turbid oceans close to the coast has suffered from large uncertainties due to difficulties in separating radiances from the atmosphere and ocean surface, besides cloud contamination and an inadequate knowledge of aerosol optical properties (c.f. Li et al. 2009 for an overview). The problems were noted and demonstrated by Jeong and Li (2005, JGR) across the Northern Pacific and

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Atlantic off the Africa where they are most serious but have not been resolved. The retrieval algorithm presented here is novel and promising to tackle with the problems more effectively than any existing methods. Overall, the paper is well-written.

I have a few minor comments which may help enhance the quality of the paper.

This paper seems to be a part of a systematic study tackling with the same set of problems which should be commended, but it is also necessary to clearly elaborate their distinct merits, e.g. with the following study:

Shi, C., Nakajima, T., and Hashimoto, M.: Simultaneous retrieval of aerosol optical thickness and chlorophyll concentration from multi-wavelength measurement over East China Sea, *J. Geophys. Res.: Atmospheres*, 121, 14084-14101, 2016.

How much of the improvement presented in this paper originated from that paper? Are they different just in terms of aerosol models used in different regions?

The Section 2.3 of this paper is rather similar to the Section 3 of Shi et al. (2016). The description of this method is not clear enough. It'd be better to add a flow chart of the algorithm.

It'd be nice to present any spatial distribution maps of the retrieval results for the AOT and nLw.

Page 7 line 27, what is the spatial resolution used in this research for MODIS data? Page 26, Table 3, it is better to be "nLw (412 nm) nLw (442nm) nLw (488nm) nLw (554nm)". Page 32, Figure 6f, the rationale for the particular values (The upper and lower black lines of (f) are 1:2 and 2:1) of the estimated error is not explained. Why were these values chosen? Are they purely arbitrary numbers, or are they based on some error analyses? Page 34, Figure 8, the legend of the AERONET seems solid red line, please check it. Figure 8a and b should include other statistical measures, such as  $R^2$  and RMSE. Page 32, Figure 6f, Page 35, Figure 9f, the meanings should be given of the dashed lines of different colors? Figure 6 and Figure 9 are described chiefly

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based on the 1:1 linear relationship which is insufficient for an objective understanding of the quality of the retrieval results. It's suggested to add the regression line with some additional statistical measure such as  $r$  or  $r$  squared, RMSE and  $p$ -value, etc.

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