Response to Thomas Schroeder

The paper could be significantly improved by addressing the following issues.

Dear Thomas, we appreciate your comments very much, which helped improve our manuscript greatly. We have revised our paper based on your comments carefully. We also have reworded/rephrased some sentences and added some references that may improve the paper. Our responses are listed in below after each comment.

(1) Please provide examples of derived AOT and corresponding nLw in form of images to illustrate good separability of atmospheric (AOT) and oceanic (nLw) signals, especially for glint-contaminated cases.

Response: Thanks for the comments. We add a mapped result for the retrieval of AOT at 550 nm and nL_w at 412 and 554 nm in Fig.8. The following description is added at the end of section 4.2.

"The algorithm is then applied to the selected image obtained around the East China Sea on October 2011. Spatial distributions of the simultaneous retrieval of total AOT at 550 nm, nL_w at 412 nm and 554 nm are shown in Fig. 8(c), 8(e) and 8(g), the MODIS standard aerosol products (Fig. 8(a)) and OC products (Fig. 8(b), 8(d) and 8(f)) are also added as comparisons. In general, the retrieved AOT are mostly similar to that of MODIS aerosol products, as well as OC products, where the high aerosol loading around Bohai Sea can be observed in Fig. 8(a) and 8(c), however, the MODIS AC scheme can not produce useful AOT data in this heavy aerosol area (Fig. 8(b)). In regards to the estimated nL_w at 412 nm and 554nm, there are also good consistencies between MODIS OC products and those derived from the simultaneous retrieval approach, while the retrieved nL_w at 412 nm from MODIS OC products are reported to be negative values in the north of Yellow Sea (Fig. 8(d)), where such case can be avoided using current scheme shown in Fig. 8(e)."

Since current acceleration process by the Neutral Network is not finished yet for the glint-contaminated circumstance, we will elaborate this case study in another work.

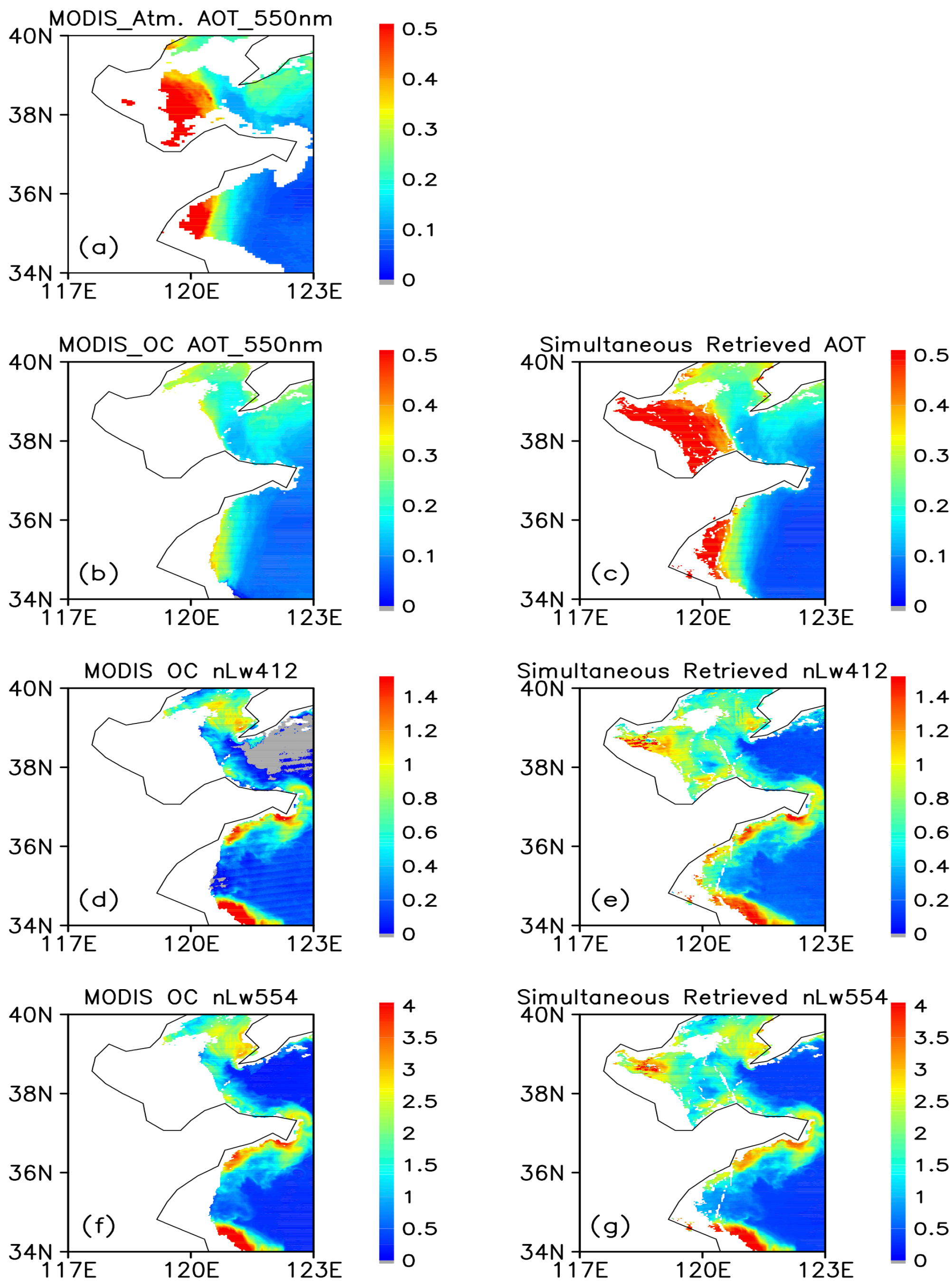

Figure 8: Comparison of satellite simultaneously retrieved AOT at 550 nm and nL_w (mw sr^{-1} cm^{-2} μm^{-1}) at 412 nm and 554 nm with MODSI operational products over East China Sea on 18th Oct. 2011. (a) MODIS Aerosol AOT products; (b), (d), (f) MODIS Ocean Color AOT and nL_w products; (c), (e), (g): Simultaneously retrieved AOT and nL_w in this study

(2) The term “one-step” inversion of the proposed algorithm is misleading as the approach is based on iterative fitting. Please clarify.

Response: Thanks. We wanted to describe the term “one-step” as the meaning that AOT and nL_w are determined simultaneously, which is different from the standard atmospheric correction schemes deriving the AOT firstly and then estimating the nL_w based on the retrieved AOT values. To make a clearer description, we modify related description on current algorithm from “one-step” to “iterative fitting” or “optimal estimation” in the revision.

(3) MODIS has no centre bands at 867 and 1628 nm. Please check the provided band settings and explain why an arbitrary mix of 1 km and 0.5 km resolution bands was used in this study.

Response: Thanks. The description of band setting is changed to “869 and 1640 nm”. In this study, we use the MODIS L1b calibrated radiance data with 1km resolution, where the 554nm and 1640nm observation with 0.5km resolution have already been aggregated to 1km resolution in the MODIS MYD021KM product.

(4) Please provide a reference for the MODIS standard atmospheric correction (AC) and a detailed discussion of the Siegel et al. 2000, Stumpf et al. 2003 and Bailey et al. 2010 modifications to account for non-zero NIR water-leaving radiance.

Response: The basic MODIS atmospheric correction scheme is from the study of Gordon and Wang (1994). The description between Line 24-26, Page 2, of original manuscript are changed as “Such methods use aerosol optical properties of nearby non-turbid areas or other spectral information, such as ultraviolet or shortwave infrared (SWIR) bands (Hu et al., 2000; Ruddick et al., 2000; Pan and Mao, 2001; Wang and Shi, 2007; He et al., 2012; Mao et al., 2013), as well as iteration techniques to determine the NIR L_w values derived from bio-optical models and L_w at visible bands based on convergence criterion (Siegel et al., 2000; Stumpy et al., 2003; Bailey et al., 2010)”

(5) Analyse and quantify in detail AOT overestimation for those cases where negative nLw was retrieved by the MODIS standard AC algorithm (Fig 6b). Are negative nLw simply a result of AOT overestimation or due to differences of the retrieved aerosol type (e.g. Angstroem coefficient)?

Response: Thanks for the comment a lot. We agreed that the negative nL_w might also be caused by the inaccurate estimation of Angstrom exponent. We check the data again and found that there are 10 cases that nL_w(412nm) values are negative, of which all the derived AOT(412nm) values are overestimated. However, the retrieved AOT at other bands are underestimated in several cases. The description of Line 10 Page 12 is modified from "which may be caused by the overestimation of AOT" to "which may be caused by the overestimation of AOT in those bands or inappropriate estimation of Angstrom exponent".

(6) Provide information of the simulated AOT ranges.

Response: Currently, we define the accepted AOT at 550 nm range is from 0.0 to 2.0.

(7) The manuscript contains numerous spelling and grammatical errors and requires careful proof-reading before publication.

Response: Thank you very much. We have had a careful check and reworded/rephrased some sentences, as well as acknowledgment and reference section, in the revision.