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# *Interactive comment on* "A robust method for removal of glint effects from satellite ocean colour imagery" *by* R. K. Singh and P. Shanmugam

**Anonymous Referee #1**

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The paper describes a new empiric al method to assess the crucial question of glint correction of ocean color imagery. A high percentage of the ocean color imagery is unavailable due to saturation of marine radiances by sun specular reflection which prevents correct chlorophyll estimation and phytoplankton discrimination. It is thus essential to get correct estimations of radiances in glint affected regions to better understand biogeochemistry of the ocean. The new glint correction algorithm (NGC) method uses no ancillary data. The algorithm uses only satellite data in the NIR and SWIR channels for the same pixels. The idea is to use either the NIR radiances (for high chlorophyll blooms) or SWIR radiances (in the case of floating blooms) and the known spectral dependency of glint reflectance (positive slope from the visible to the NIR- SWIR bands) to correct the glint effect in visible wavelengths. Substantial improvement is reached in high chlorophyll waters, compared to the defaut algorithm



used in the Seadas processing. Maybe this limitation of the NGC to high chlorophyll areas should be found in the title ? The paper is well written and clear. References are complete. Despite some needed revision, and the fact that this method applies particularly well on areas already well studied by the authors (also for aerosol correction), this paper shows that empirical method can be robust compared to more sophisticated method and can be helpful. Indeed, the radiance validation data set is still limited and collection of in situ radiances should be extended particularly in regions where bloom occur or/and in optically complex areas. The organigram of the algorithm Figure 1 is clear and explains the iteration procedure based on the value of two glint ratios (either the NIR bands, either the SWIR band) with coefficients adapted to rich chlorophyll regions until the glitter ratio reach the threshold value. It is not clear why the correction by normalized absorption by water is needed (is it normalized absorption or absorption ?). Is it necessary to take it into account only in the case of high blooms ? Values of Table 1 are not those of Pope and Fry. Explain why. Did you check the real impact of this correction and at which wavelength is it required ? Some comments requiring corrections or precisions: I am not sure to understand why this correction is not applicable to oligotrophic waters (equation 2). If it is a problem of radiance saturation by glint, which prevents the use of NIR and SWIR radiances in the case of oligotrophic areas, and shown at Figures 4abcd. In this case, this should be clarified by a sentence. The performance of the glint correction is well described in high chlorophyll bloom areas, mainly in the Arabian Sea. Many examples are shown (illustrations) and statistical data (tables) are given to show the spectacular effect of the new correction algorithm in these areas. Figure5: obviously, the figure shows the impact of NGC compared to SGC but there is no in situ radiance validation at this time. How do we know that b) is better than c) and d) and e) (is it better if the difference Lrc-LTg is flat along the transect ? is this difference Lra +Lw ?) Figure 6: it is important to note that final results of the NGC also depend of the successful application of a new algorithm for aerosol correction (CAAS, Shanmugan, 2012). This is shown at Figure 6. As a result of the NGC application compared to the SGC, the aerosol is no more overestimated, and consequently, visible radiances are correctly retrieved (chlorophyll overestimation is limited) and this depends also on the new aerosol correction scheme. Thus, objectively, in the absence of in situ data: how do we know that the NGC result in f) is right compared to the e) ? how do we know that the bloom is better retrieved ? Figure 7 shows the effect on radiances and are convincing. Figures 8 and 9 (false color composites) are difficult to interprete, and as they are just illustrations and nobody can tell id SGC or NGC are correct without comparing spectra, I suggest reducing the number of these images 8 and 9 to only one example. Figure 10: without in situ radiance data or sea truths chlorophyll data, it is not clear if chlorophyll is overestimated by SGC or not. Page 2809. Do the authors suggest that aerosols SGC correction prevents the use of images during sand transport ?in this case, say it clearly. Figure 11: why do not we get the regression coefficients of these figures ? The mention of Table 2 is not found in the article (should be there). We see that for non glint-contamined pixels, NGC better retrieves radiances at 667m while the retrieval success is not so high for higher radiances (other wavelengths in the blue-green). Please, explain. Figure 11c: why such an underestimation of radiance by NGC or SGC and so what prevents the possibility to get the right magnitude of the in situ spectrum ? please, explain. For Figure 11g, markers are not different enough, please use either empty and full squares or circles. Again, the NGC effect is higher on lower radiances, please explain. Again, Fig 11h, explain why the Lw is not correctly retrieved either by NGC either by SGC : do you have an explanation of such a discrepancy in both algorithms ? Page 2593 : the most of the cases should be most of the cases Page 2805 : Fig 3j should Fig 4j. Tables 1 or 2 : I did not find mention of these tables in the text. Table 2 legend should indicate Error statistics on Lw values produced by SGC and NGC algorithms

Please also note the supplement to this comment:
http://www.ocean-sci-discuss.net/11/C1222/2015/osd-11-C1222-2015-supplement.pdf



Interactive comment on Ocean Sci. Discuss., 11, 2791, 2014.