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Ocean Science
Discussions

Interactive comment on "High resolution satellite turbidity and sea surface temperature observations of river plume interactions during a significant flood event" *by* V. E. Brando et al.

Anonymous Referee #1

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Review of the manuscript "High resolution satellite turbidity and sea surface temperature observations of river plume interactions during a significant flood event" by V. E. Brando, F. Braga, L. Zaggia, C. Giardino, M. Bresciani, D. Bellafiore, C. Ferrarin, F. Maicu, A. Benetazzo, D. Bonaldo, F. M. Falcieri, A. Coluccelli, A. Russo, and S. Carniel, submitted to Ocean Science.

General comments

This paper shows the capabilities and advantages of using high-quality high spatial resolution information to detect and characterize plume structures at the meso-, submesoscale and smaller structures. The results are well presented and supported with

supplementary data of sea surface salinity from an operational model. The results presented are promising and show the advantages of using high resolution remote sensing and highlights the importance of the coming high resolution systems (Sentinel-2 series) to improve the temporal resolution of existing systems. It also evidences the need of field data to characterize the optical properties of the different rivers and to validate satellite-derived products.

In what follows specific comments and more technical corrections are indicated which should be addressed before accepting the manuscript for publication.

Specific comments

- It'd be interesting to show another L8 image (either RGB or T or SST) to show a "normal" or non flooded situation to highlight the difference in the properties found in the two cases.

- Is there any reference in the literature about this near-shore trapped warm waters (NTTW)? Have they been previously described? What do the authors think or hypothesize about the origin of these waters?

- In order to show more clearly the relation between the three variables analyzed (T, SST and SS) information of SSS for each site could be included in Figure 5c in different colors, while the shape could be used to identify their location

- In Section 3.5, it is mentioned that the two ROFIs identified are "Plume F" type, following Horner-Devine et al. (2015) classification. And it's stated that the borders can be identified by the 36 isohaline corresponding to the 5 FNU and 18°C isotherm. From figures 4 and 5 this seems to be the case for the cyclonic coastal current, but not for the western rivers, where the 36 isohaline does not correspond with the 18°C isotherm or 5 FNU isoline, but is located further offshore. Thus both SST and T seems not to be good indicators of the region of freshwater influence. Include some discussion in the text about this.

- Using in situ data and simulations Dogliotti et al. (2015) showed that uncertainty for turbidity estimation is expected to be low (typically less than 6% using simulations and ∼13% from in situ data). Thus, the high variability in the composition of the region is not expected to affect the algorithm accuracy, but the relationship between T and suspended matter concentration for each river. Indeed, future work is needed to characterize the optical properties including side-scattering (turbidity), i.e. to validate the cited algorithm.

Technical corrections

Page 1672, line 22: During this combines flood event a total of ∼15 km3 of freshwater entered NAS, ∼10 km3 of which entered the basin by 19 November 2014. Page 1673, line 5: change the future to the past tense in order to use the same tense in the whole paper, i.e. In this study we combined SST and turbidity maps derived from L8 imagery... Page 1673, line 9: change "plume" with "plumes' " in ... interpretation of the plumes' dynamic and their interaction... Page 1673, line 17: Define VNIR and SWIR acronyms Page 1673, line 18: Define SNR Page 1674, line 5: Please, give more details regarding the atmospheric correction. Which bands were used: NIR (VR 2014) or SWIR (VR 2015)? In case of the later, epsilon was calculated on a pixel basis or it was calculated for the whole scene or a sub-scene? Page 1674, line 10: did the authors mean top-of-atmosphere brightness temperature? Page 1674, line 11: add wavelength of L8 band 10 for clarity (10.9 um) Page 1674, line 21: define ARPA Page 1675, line 2: add "the" in: ...followed by the effect of increasing... Page 1675, line 7: change of with than ("...smaller than 0.3 m.") Page 1676, line 13: associate the spectra from the center of the basin with the name given in Fig. 3. e.g. "the spectra for the center of the basin (indicated as open waters in Fig. 3a) have a peak at 443 and 482 nm, typical of blue waters..." Page 1676, line 16: add a comma (,) after "... a 562 nm peak, typical of green waters..." Page 1676, line 25: change "similarly" to "similar to values found at rho(655)" Page 1677, line 5: add "the" in "The yellow /brown shades of the other rivers..." Page 1678, line 18: Add FNU after 10-30 range Page 1679, line 3-4:

add "than" after higher Page 1681, line 21: Add a comma (,) after "Moreover,"

Figures - Fig. 1: Add a small and more regional map as inset of Fig. 1 to clarify the location of the study site. - Fig. 2: Indicate in the legend the source, i.e. who or which institution provided the data, of the rivers' discharge values and location of their measurements (at least distance from the sea or distance upstream). - Fig. 4: add color bar to the SST map

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Interactive comment on Ocean Sci. Discuss., 12, 1669, 2015.