Reviewer # 1

This revised manuscript entitled "Characterizing the origin of excess dissolved organic carbon in coastal seawater using stable carbon isotope and light absorption characteristics" by Han, Hwang and Kim has been improved significantly, especially the Discussion. The comments and suggestions made by myself to the authors in the first-round review have been well addressed. I recommend this paper to be published in Biogeosciences.

➔ Thank you for your valuable comments.

Minor comment:

Line 338: Please add the publication year for the referenced paper "Stedmon, C. A. and Bro, R.".

➔ changed as suggested (lines 325–326)

Reviewer # 2

The work by Han et al. describes the DOM distributions in Sihwa Lake in spring 2017 and 2018. The multiple properties of DOM have been investigated e.g. the FDOM, the DO13C and so on. I generally agree with the comments by reviewer 1 and 2 in that this work provides a comprehensive view of the characteristics of coastal DOM with the involvement of multiple analysis on different aspects of DOM properties, and the authors have responded the comments in details. However, as pointed out by reviewer 2, the lack of clear logical argument gave me some difficulty to reach the conclusion. This was not quite improved in the revised version submitted. Thus I would suggest the authors to reorganize the discussion section for a more logical argument. The following comments may be of some help for this purpose.

➔ Thank you for your valuable comments. We have thoroughly reorganized the discussion section for better logical flow and clarity.

1. The authors should more clearly summarize the new information this work brings in for our knowledge of DOM cycling in Sihwa Lake. This should be significantly beyond Kim and Kim's work (2016) which studied the optical properties of DOM in Sihwa lake and found the contribution of the porewater to the DOM in water column. What is the major difference between Kim and Kim's finding and the conclusion in this manuscript that sediment OM is the major source of DOM in Sihwa Lake? The introduction section should more focus on the specific processes or new information this work identified. Progresses from other labs should be discussed in details in the introduction. A more logical argument of the conclusion should consider the followings:

➔ In the revised manuscript, all these comments were carefully taken into account (lines 175–181).

2. What is the excess DOM? It is denoted in the manuscript as the part of DOC measured in 2017 above the mixing line of DOC in 2018. If my understanding is correct, this idea tries to evaluate the DOM influenced by conservative mixing of two endmembers (freshwater and seawater DOM) and the part of DOM added / removed during the mixing. However, the excess DOC denoted here is under the assumption that the DOC concentrations of freshwater endmembers remained constant between 2017 and 2018. Please provide enough evidence and argument to prove this assumption is reasonable. Plus, the excess DOM should be denoted at the first place it is mentioned except in the abstract.

➔ We agree with the reviewer that the terrestrial input can be temporally variable. We decided to use the DOC concentrations in incoming open-ocean water as a background and considered any values higher than the background value as an excess (lines 193–195). Therefore, in this case, additional riverine input becomes a part of the excess DOC. The sources of excess DOC were discriminated as follows: (1) marine sediment source in low-salinity waters, (2) terrestrial source in some high-salinity stations, and (3) marine source in some high-salinity stations.

➔ In addition, all other comments were taken into account in the revision.

3. Clarify the sources based on the properties of DOM. The origin of DOM in group 2 in the conclusion (and in the abstract) is more like a description of DOM properties which are characterized as lower DO13C, non-fluorescent, and low MW. The author should clarify what is the specific source and why the DOM from this source have these properties. Clarify the difference of terrestrial OM in group 2 from the source of DOM in the low salinity water.

➔ We have added some more details on this issue in the discussion (lines 211–214).

Minor comment:

Some minor comments as following:

1) whenever use "significant" in the text, please provide statistical analysis;

2) FDOMH mentioned in discussion was not defined in method section;

3) Change "uM" to "umolL-1"

4) Line 31: delete “reduced”.

➔ All minor comments were taken into account in the revised version.

Reviewer # 3

1. Please provide background information on source and dynamics of NH_4^+ in coastal waters in the introduction section before using it as a tracer in the manuscript.

➔ We used NH_4^+ to show the general environmental condition of study sites, and thus we refrained from providing detailed description on NH_4^+ cycle in the introduction.

2. DO is measured in this study, but not used or discussed. It can be taken out if it does not add any useful information.

➔ We added a brief description on DO in the revised version (lines 177–180). Also, DO is usually a critical parameter in biogeochemistry and hence we wanted to show this parameter although it was not described as a major controlling factor of DOM properties in our study.

3. Please provide water residence time in spring vs. fall if possible.

➔ It is not easy to know the exact residence time of the water. The residence time of the water body in the lake is likely controlled mainly by water exchange through the sluice. We, therefore, provide a rough estimation of the turnover time of the water to be about one year simply based on the water exchange rate and the volume of the lake water.

4. The DOC input source may vary significantly with seasons, so it might not be appropriate to used the mixing line based on data from September of 2018 as the baseline to define the excess DOC for data from March of 2017. A proper assumption has to be made.

➔ Yes, we changed this in the revised version. We decided to use the DOC concentrations in incoming open-ocean water as a background for calculating the excess. Please see our response to Reviewer #2.

5. The authors suggested the marine sediments as the major source of DOC, based on carbon isotopic signature and correlation between DOC and NH_4^+, which seems to be rational. But a linear mixing line showing a decreasing trend of DOC with salinity was also observed. This usually occurs when terrestrial input is the major source of DOC. Please explain why marine sediments as the major source could result in such a DOC distribution pattern.

➔ Although the DOC and salinity showed linear correlation indicating possible contributions of terrestrial inputs, our DOC–$\delta^{13}C$ values (–20.0±0.4‰) observed in low-salinity (<28) waters here exclude possible significant contributions of terrestrial sources, indicating the effective degradation of terrestrial sources before they reached the mixing zone. In this kind of tidal flat environments, the large inputs (i.e., seepage) of DOC and $FDOM_H$, together with NH_4^+, could happen from marine sediments, as the shore water runs back and forth on a wide sediment-surface area over a tidal cycle (Kim et al., 2012). In this case, depending on salinity ranges of overlying waters, different slopes of DOC and $FDOM_H$ against salinities could be observed for different seasons as shown in this study (lines 175–181).

Minor comment:

Line 290, please clarify how bottom sediment porewater was excluded as the source of DOC.

Line 299, changes in input sources could also result in S_R variations.

Figure 2, please provide information on how grouping was defined in the caption.

Figure 5b, I suggest drawing a single regression line instead of two.

➔ We made all above technical corrections as suggested in the revised version.

Reference:

Kim, T.-H., Waska, H., Kwon, E., Suryaputra, G. N., and Kim, G.: Production, degradation, and flux of dissolved organic matter in the subterranean estuary of a large tidal flat, Mar. Chem., 142–144, 1–10, http://dx.doi.org/10.1016/j.marchem.2012.08.002, 2012.