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Interactive comment on "Carbon cycling in the North American coastal ocean: A synthesis" *by* Katja Fennel et al.

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The paper presents a synthesis of carbon cycling on the continental margins of the United States , including the Atlantic, the Pacific and the Arctic coasts. The authors concentrate on the CO2 exchange between air and seawater as it is the most documented and tabulated parameter for carbon exchange in the ocean, and specifically in coastal zones. They propose an overall map of air-sea CO2 exchange for the East, West and Arctic coasts which shows a large tendency of these shelves to be a sink for CO2 (Fig. 3) and then discuss the results by geographic zone which makes a long and rather tedious paper to read. At the end, the acidification question is raised and shortly discussed. Overall, the paper is long but well written and proposes a good synthesis for all researcher interested by carbon cycling in the coastal zone. By discussing the

different regions separately and addressing different "cases" (large shelves, upwelling, arctic, enclosed sea-GoM), they provide insightful explanation for the observed CO2 fluxes. I think that the paper is publishable after minor revisions.

Detailed comments:

Page 3, line 10: The coastal ocean is defined as "non-estuarine waters", which is questionable regarding CO2 budgets for the coastal zone since estuaries and deltas are sources of similar magnitude compared to coastal ocean sink... It should be emphasized at this point in text that this cutting off estuaries and deltas is because of the paper by Najjar et al. (2018) which has already addressed the estuarine and tidal wetland's part of the C Cycle.

Page 5, line 15: "colder shelf water is denser". The authors should cite reference work by Canals et al. (2006, Nature Vol 444, doi:10.1038/nature05271) on cascading in canyons which is the ultimate case of cold and dense water diving in the lighter open sea.

Page 6, line 8: "burial and export of carbon... remove atmospheric CO2". The authors should specify that this is true only for ORGANIC carbon, as inorganic carbon burial will result in net CO2 increase in the zone of CaCO3 formation (2 HCO3- + Ca2+ → CaCO3 + CO2 + H2O).

Page 14, line17-18: "DIC is a component of the brine whereas total alkalinity precipitates...as ikaite". I do not understand why alkalinity would precipitate without DIC. He sentence should be modified to "precipitation of CaCO3 as ikaite changes the DIC to Alkalinity ratio by consuming two times more Alk than DIC during the process..."

Page 18, line 10: "... pCO2 gradient are indicative" I would rather say "is the appropriate indicator for"

Page 18, line 12: "and cross shelf exchange", please add "potential" cross shelf exchange

Page 19, Fig. 6 legend: please add uncertainty to the slopes “1.86 ppm/y and 1.95 ppm/y “ as reported in text for the shelf seas (pge 18, line 14-17).

Page 20, line 10: cut sentence after “oyster larvaes in the coastal Pacific Ocean”.

Page 22, line 13-16: These sentences which describe the overall CO2 flux in the coastal ocean make little sense. The main conclusion of the study is that these margins are sinks for CO2 (either natural or anthropogenic) and this should be the first and main sentence in this paragraph, before summarizing the details.

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