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Interactive comment on "Hurricane Arthur and its effect on the short-term variability of pCO_2 on the Scotian Shelf, NW Atlantic" *by* Jonathan Lemay et al.

Anonymous Referee #1

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Overall Statements:

The manuscript "Hurricane Arthur and its effect on the short-term variability of pCO2 on the Scotian Shelf, NW Atlantic" by J. Lemay, H. Thomas, S.E. Craig, W.J. Burt, K. Fennel, and B.J.W. Greenan presents the interaction between physical and biogeochemical processes on the Scotian Shelf, an open shelf sea with a complex water mass structure. The manuscript focusses on a strong wind event in July 2014. As shown, similar events emerge in this area very often. The authors did the first step in broadening the studied time interval by applying a spectral analysis. But this analysis has no further consequences within the manuscript. I would suggest to omit the spectral

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Discussion paper

analysis or to use its results for further storm event-related carbon flux estimates on longer time scales (or other biogeochemical analysis).

The manuscript is well structured and is equipped with mostly significant figures, but it contains several partly severe errors. The conclusion repeats more or less the findings. This section could be used for more general statements on storm effects on biogeochemical fluxes.

Detailed remarks:

L29: land, ocean, sediment, and atmosphere

L60: give the extent of the Scotian Shelf (lon1-lon2, lat1- lat2)

L61: at which position are the annual cycles in Fig. 2 valid?

L61ff: Which is the origin of the deep high salinity water?

L70: Indicate “CIL” in Fig. 3

L73: I do not see 20 °C in Fig. 3i

L75: The given salinity range does not fit to Fig. 2ii

L85: Fig. 2iv

L131: At which depth are the measurements taken?

L131: Give here the time interval when the buoy was applied.

L175: You mean DICS? Where S is upper case?

L176: represents the freshwater end member

L178: + DICS=0

L182: In Wanninkhof (2014) the gas transfer velocity has the unit (cm/h), so I would expect another constant to end up with mol m-2 s-1.

L205: Give a motivation for the choice of the time interval.

L234: The denoted time interval in Fig. 5 does not fit to the time interval in the text.

L263: “Figure 8 also shows that the density steadily increases with depth (Fig. 8a), and ..”

L264: You combine T/S profiles from June 28 (other year?) with DIC profiles in July/August 2014. Why is this valid?

L262: My mixing calculations result in a depth of 40-50m. Mixed T=9 °C. Upper value 14°C. Makes 4°C as lower value, to be found at 50m depth.

L278: This sentence fits to my calculation (40-50m).

L301: There must be other sources of heat. Mixing alone should have reduced surface temperature. Please discuss this.

L301: From day 186 to the maximum value I see an increase of 40%.

L335: For a reduction of one unit in salinity the mixing should have taken place from the surface to about 70m depth (compare Fig. 2)

L342: where does this number (45 mmolC m-2 day-1) come from? Which C:Chl ratio did you use?

L376: Reference missing.

L495: Give position.

L519: Why “Climatologies”?

Fig. 5: Please give more time ticks.

L527: which DIC profile is used? July 22 or Aug 3?

L530: refer to Fig. 8

Fig. 11: Omit this figure. It is not necessary. Omit also “Figure 11” in L365.

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