

## ***Interactive comment on “On the role of climate modes in modulating the air-sea CO<sub>2</sub> fluxes in Eastern Boundary Upwelling Systems” by Riley X. Brady et al.***

**Anonymous Referee #1**

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Review of manuscript bg-2018-415 "On the role of climate modes in modulating the air-sea CO<sub>2</sub> fluxes in Eastern Boundary Upwelling Systems" by Riley X. Brady, Nicole S. Lovenduski , Michael A. Alexander , Michael Jacox , and Nicolas Gruber.

This is a nice piece of work trying to link modes of natural climate variability to fluctuations of air-sea CO<sub>2</sub> fluxes in Eastern Boundary Upwelling Systems (EBUS). The latter regions reveal strong upwelling of cold and nutrient-rich water masses, a prerequisite for ecological richness and diversity. Although small in area, EBUSs play an important role in the air-sea exchange of CO<sub>2</sub>. Utilizing 34 ensemble members of simulations with the Community Earth System Model (CESM-LENS) the authors have analyzed

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the correlations between natural climate variability (ENSO, PDO, NAO, ...) and air-sea CO<sub>2</sub> fluxes for each of the four EBUSs.

The manuscript is clearly written and the conclusions comprehensible. Therefore, subject to very minor revisions I recommend publication in Biogeosciences.

Specific comments:

- (1) page 5 equation 2: The variable U is not defined (presumably wind speed).
- (2) page 5 last sentence: “To compensate for autocorrelation ...” This should be explained a bit more in detail. Readers not familiar with the statistical methodology will not understand it.
- (3) page 6 lines 18+19: “ ... the data density of pCO<sub>2</sub> in EBUS informing the SOM-FFN is on the order of the Southern Ocean, ...” This statement is too vague. It would be good to be a bit more quantitative.

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