

Interactive comment on “Coastal upwelling fluxes of O₂, N₂O, and CO₂ assessed from continuous atmospheric observations at Trinidad, California” by T. J. Lueker

Anonymous Referee #3

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The manuscript “Coastal upwelling fluxes of O₂, N₂O and CO₂ assessed from continuous atmospheric observations at Trinidad, California” by T. J. Lueker focuses on the assessment of sea to air fluxes of selected gases (O₂, N₂O and CO₂) relying on atmospheric observations. Continuous measurements of these gases in the atmosphere have been used to unravel the terrestrial and marine fingerprints notably in the O₂ and CO₂ observations. As first step air-sea fluxes have been estimated with the aid of various hydrographic data. Next a regional air-sea flux estimate is provided under consideration of satellite based sea surface temperature and wind data.

Notably the last step, the regional assessment of the fluxes seems to point to a possible future way of assessing CO₂ (and other) air-sea fluxes. The manuscript describes well the way to this approach, although in parts very concise. Compared to the ship based observations the use of remote sensing data offer the clear (and known) advantage with regard to the spatial and temporal coverage of the analysis. It would be helpful to

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address the question, which density of atmospheric observations is required to provide a reliable regional (or even larger) estimate. In the current study data from only one atmospheric are used. Would this be sufficient and up to which regional coverage?

The manuscript is well written and all figures are clear and useful, however in general too concise. Somewhat more background information would help the reader to better understand the approach. I have commented on this point below. My recommendation would thus be to accept the manuscript “Coastal upwelling fluxes of O₂, N₂O and CO₂ assessed from continuous atmospheric observations at Trinidad, California” by T. J. Lueker after some minor revisions.

Detailed comments:

P337, 1st para: It would be helpful to introduce the use of N₂O data more in detail. What is the advantage or what is the message of the N₂O data? Is the N₂O somehow related to any oxygen depletion in the water column along the shelf or is it simply used as an indicator for marine biological activity?

P339: How was the N₂/O₂ ratio established? Was N₂ considered to be known (and stable) or were there accompanying N₂ measurements?

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