

Interactive comment on “Central-Pacific surface meteorology from the 2016 El Niño Rapid Response (ENRR) field campaign” by Leslie M. Hartten et al.

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[12pt,a4paper]article [latin2]inputenc graphicx ulem amsmath **Response to Referee #1 of essd-2017-126**

Referee comments are in *italics*; our responses follow each comment. A track-changes revised manuscript is uploaded as a supplement, and contains changes made in response to Anonymous Referee 1's comments as well as some edits we have made on our own.

Referee #1:

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General comment 2 (excerpt): *After the authors carefully discussed the surface pressure measurement and calibration, I don't see surface pressure listed in the final variable list in Table 5.*

RESPONSE: One-minute values of the surface pressure from the NOAA Ship *Ronald H. Brown* are available in the ship's surface meteorology data set (Cox et al. 2017b, doi:10.7289/V5SF2T80) that is also documented in this manuscript. We did not include a one-hour version of the data in the surface flux data set because no changes had been made to the data beyond averaging. However, the reviewer's interest in such a time series is fairly easy to accommodate.

ACTION TAKEN: We have added hourly surface pressure, corrected to 3.8 m, to the surface flux data set and are in the process of submitting the revised file to NCEI. We have modified Table 5 and the associated text in section 4.3 accordingly.

General comment 2 (excerpt): *Unfortunately, no eddy-correlation turbulent fluxes are available. However using the sonic anemometers on the ship, the standard deviation of wind speed can be given in the final dataset, which can be very useful for representing turbulence intensity.*

RESPONSE: If wind data had been collected at 10 Hz or 20 Hz, sensible heat fluxes from eddy correlation would be possible, albeit with additional uncertainty compared to more conventional land-based observations because of the ship's motion (Fairall et al. 1996). In actuality, the ship's sonic anemometers operated at 1 Hz (c.f. Table 2), so any turbulence information that might otherwise be in the wind variance has been lost. Instead, estimations of both latent and sensible fluxes using bulk calculations were provided (Table 5). The algorithms used to make the calculations were developed for the tropical ocean and validated there in situ against direct measurements from eddy covariance (Fairall et al. 1996). The bulk fluxes should be considered significantly more robust than a proxy for intensity based on the standard deviation of the 1 Hz winds.

ACTION TAKEN: We have added clarifying statements to Section 4.

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Detailed comments:

. **P.4, L.21.** *"both sites", I guess they are the island site and the ship site. Is this correct?*

RESPONSE: This is correct.

ACTION TAKEN: Reworded sentence and explicitly named the sites.

. **P.6, L.25.** *So the radiosonde relative humidity is better?*

RESPONSE: Yes, we believe that the radiosonde humidity values are better than the HMP45C humidity values because the humidity sensor in each radiosonde was calibrated during the ground check procedure. We are not claiming this as a general result, but as one specific to the measurements that we took during this campaign.

ACTION TAKEN: We have altered the beginning of the paragraph to explicitly declare our trust in the radiosonde humidities because of that calibration, and to tie our in-field awareness of HMP45C problems to that trust.

. **P.7, L.1.** *Was the RH/T sensor on the island aspirated?*

RESPONSE: The HMP45C was shielded from radiation (c.f. Table 1 and Figure 2) but not mechanically aspirated.

ACTION TAKEN: We have enhanced the shield's description in Table 1, and have added an explanatory footnote to the manuscript text that gave rise to the question.

. **P.14, L.3.** *It is better to list variables calculated with the COARE flux algorithm in the final dataset here for those who are not familiar with the algorithm.*

RESPONSE: We respectfully disagree. The surface flux data set referred to includes 43 variables; we list all of them in Table 5 (cited on P.14, L.6 of the submitted manuscript) and in that table also clearly identify the 30 that come from the COARE flux algorithm. To list them in the text would take many lines, would distract from the

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purpose of the paragraph, and would, we believe, make it much harder for people to find the information.

ACTION TAKEN: We have added the following statement at the introduction to the COARE flux algorithm in section 4, before Table 5 is cited: "These calculations include an estimate of the full surface heat budget (see Section 4.3)".

. **Figure 4.** *It will be easy for readers to understand the dataset if the locations of the island and the buoys used in the dataset are marked in the figure.*

ACTION TAKEN: We have added a second panel to this figure, showing the locations of Kiritimati Island and of the buoys used in validating/correcting the surface data collected by the NOAA Ship *Ronald H. Brown*.

. **Figure 5.** *What does the "ground station" include here?*

RESPONSE: This refers to the radiosonde ground-check equipment. Much of our knowledge on how to collect data with these instruments has been transmitted orally and/or in a hands-on setting, with documentation primarily used for technical and procedural details. This has allowed our language to become imprecise. We appreciate the reviewer drawing this to our attention; it forced us to review the literature and sharpen the language in this manuscript as well as in the companion manuscript about our radiosonde data.

ACTION TAKEN: After reviewing the Vaisala literature's nomenclature, we have edited the annotation on Figure 5 to say "ground check set". We have also checked all in-text references to the radiosonde equipment and software, clarifying or correcting it to bring it into alignment with Vaisala usage, and adding some citations to the Vaisala literature in the process.

. **Figure 6.** *Is "surface pressure" here the pressure at the island or on the deck? Soundings were launched on the deck of the ship only, is that correct?*

RESPONSE: This figure uses data from Kiritimati Island. The ship-based soundings

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were launched from the fantail.

ACTION TAKEN: We have improved the caption of Figure 6 in order to identify the source of the data.

. **Figure 9.** *Is the "surface temperature" here the surface air temperature at the island?*

RESPONSE: Yes, this figure uses data from Kiritimati Island.

ACTION TAKEN: We have improved the caption of Figure 9 in order to identify the source of the data.