

Response to Dr. Waterloo's comment on "Divergence of reference evapotranspiration observations with windy tropical conditions".

We thank Dr. Waterloo for his thorough review, commendations, and recommendations. We respond to his specific comments and technical corrections (noted below in *italicized text*)

Title: I would suggest to include "actual evapotranspiration" and "irrigated sugarcane" in the title, e.g. "Divergence of actual and reference evapotranspiration observations for irrigated sugarcane with windy tropical conditions".

The current title was selected due to its relative brevity among the options considered. However, we agree that the suggested additions would more precisely describe the study, and we would gladly include them in any revision.

Section 2.1. The eddy covariance technique needs a good fetch and preferably a rather flat surface within the fetch. What was the relief of the area surrounding the towers, is the general area sloping towards the west as suggested by the drainage pattern? Does this have implications for the rotation needed to create an average vertical wind speed of zero for the EC system?

The general slope at Windy is downwards moving from west to east and at Lee the slope is from east to west. The fields lie on opposite sides of the saddle of Maui's Central Valley. However, the slope in both towers' footprint is less than 3% as determined from the ~10 m resolution (1/3 arc second) National Elevation Dataset provided by the United States Geographic Survey (<http://ned.usgs.gov/index.html>). This relatively low slope satisfies the flat surface requirement of Eddy Covariance. We can add specific details on slope and aspect to any revision as desired by the reviewer(s) or editor(s).

Rainfall varies between 275 and 1275 mm/y. The towers are in the South, so was rainfall input at the sites much lower than ET_EC (1170-1390 mm/y)?

Yes. Maui was also in a drought during the study period; precipitation as measured at nearby weather stations operated by the farm measured was less than 50% of normal (~300-350 mm/year for this part of the plantation - see page 5 of <http://www.hydrol-earth-syst-sci-discuss.net/11/C2863/2014/hessd-11-C2863-2014-supplement.pdf> for details of farm weather stations).

Sections 3.2 and 3.3. Different cumulative / daily actual and reference evapotranspiration rates are presented in the text for mid-period and for the whole period (the latter not for ET_EC unfortunately!). I would like to suggest that a summary of these ET rates be presented in a table for easier comparison. I would like to suggest that this table also include information on cumulative rainfall in the different periods and additional irrigation inputs to provide a water balance summary. Inclusion of the latter values would perhaps better support the contention of the authors, expressed on page 6492, l. 18, that cumulative ET_EC was always lower than irrigation plus precipitation.

Following Dr. Waterloo's suggestion, we would include a table of ET values, precipitation, and irrigation for both sites in any revision. As an alternative, we could include a figure similar to Fig. 1 in our response to anonymous reviewer #1 (see <http://www.hydrol-earth-syst-sci-discuss.net/11/C2863/2014/hessd-11-C2863-2014-supplement.pdf>) if the reviewers and editors feel that a figure would be preferable to a table.

Section 4.1. The actual evapotranspiration rate ET_EC presented here is based on dry canopy conditions (transpiration + soil evaporation), as the eddy covariance system does not give reliable estimates under rainfall and wet canopy conditions. These missing wet canopy periods were filled using the Max Planck Institute tool based on results from (dry) periods with similar micrometeorological conditions. Rainfall interception loss is perceived quite low for sugarcane in Brazil (4-7% of precipitation - P.R. Leopoldo and A. de P'adua Sousa and S. T. Filho, Interceptação da água de Chuva em Cultura de Cana-de-açúcar, Brasil Açucareiro, 1981, 98, 6, pp. 9-16; Cabral, O.M.R. and da Rocha, H.R. and Gash, J.H.C. and Ligo, M.A.V. and Tatsch, J.D. and Freitas, H.C. and Brasílio, E., Water use in a sugarcane plantation, Global Change Biology - Bioenergy, 2012, 4, 5, pp. 555-565).

Arguably, actual evapotranspiration ET_EC may be somewhat underestimated because rainfall interception losses may have been higher than the corresponding transpiration values used for gap filling under the specific high wind / low aerodynamic resistance conditions of the Hawaii sites, and with possible advection effects due to the proximity of the ocean to the sites. Would it be possible to comment on this in the discussion?

We agree with Dr. Waterloo that the inability of Eddy Covariance to measure actual ET during rain results in missed ET from evaporation from wet surfaces. However, given the relatively small amount of rainfall (less than 200 mm over the course of this study) in comparison to the total hydrologic budget, we argue that interception losses are a small component. Including interception would change our total ET little even if we assumed a high interception percentage (10% of rainfall). Nevertheless, this is a valid caveat, and we would address it in any revision.

Authors might also compare their actual evaporation rates and r_c and r_a values for sugarcane with those also observed by eddy covariance by Cabral et al. (Cabral, O.M.R. and da Rocha, H.R. and Gash, J.H.C. and Ligo, M.A.V. and Tatsch, J.D. and Freitas, H.C. and Brasilio, E., Water use in a sugarcane plantation, Global Change Biology - Bioenergy, 2012, 4, 5, pp. 555-565).

We can include a comparison of approximate ET rates and canopy and atmospheric resistance values as reported by Cabral et al. (2012). We do note, however, that Cabral's site is entirely rain fed and could have ET and canopy resistance differences due to water stress.

6476 l. 18-19: Reference Hoogebloom should be Hoogenboom, correct in reference list 6477 l. 10: Reference again, Hoogenbloom should be Hoogenboom 6481 l. 21: place dot (.) after , respectively) to end sentence

We thank Dr. Waterloo for catching this, and we will make the change in any revision.

Markers in Figure 11 are very closely plotted making these difficult to distinguish, use different colours here perhaps?

We will likely use differing colors on this and other plots throughout any revised manuscript.