

## ***Interactive comment on “On the parameterization of turbulent fluxes over the tropical Eastern Pacific” by G. B. Raga and S. Abarca***

**Anonymous Referee #2**

Received and published: 20 July 2006

On the parameterization of turbulent fluxes over the Tropical Eastern Pacific

This paper presents original results on simple parameterizations of turbulent fluxes and turbulent kinetic energy for large-scale and climate models over the Tropical Eastern Pacific. These parameterizations are derived from flux estimates obtained with the Eddy Correlation (hereafter EC) method applied to turbulent airborne measurements. The measurements were carried out near the surface (25 to 50m), during the East Pacific Investigation of Climate (EPIC 2001) and the Gulf of Tehuantepec Experiment (GOTEX) in 2004. The new parameterizations are compared to other current empirical relationships like those from Fairall et al. (1996), Mendoza et al. (1997) which is commonly used by the authors and Kara et al. (2000, 2002). This paper contains valuable results and provides parameterizations over a wide range of wind speed situations but

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

it is too concise and it really suffers from a lack of information about the data and conditions of measurements. Therefore, the analysis is weak and the differences observed between the flux estimates from the various parameterizations are not explained but assumed. In my opinion, this paper is worthwhile publishing but I suggest to achieve some major improvements concerning the analysis prior to publication.

Specific points :

## 2. Measurements and methodology :

In my opinion, this section is too short and really lacks information about the data. For instance, I suggest the authors could add a map with an example of a flight pattern (with the closest coast to evaluate the distance to the continent) to locate the area. It could be interesting to see a distribution of the stability index and the true wind speed, at least, to have an idea of the meteorological situations sampled during the campaign. p. 5254 : it is not so obvious to compute EC fluxes from aircraft data. Did the author applied specific filters? Did they use specific criteria to detect outliers? Since we have no information about the experiment conditions, I wonder whether the aircraft flew within the surface boundary layer (the ABL can be low over the sea) and did the authors check that point? In addition, it would be interesting to know the number of samples used to derive the parameterizations and the percentage of outliers rejected?

3. Results and discussion : 3.1 Determination of turbulent fluxes Again, I find that the section could be more developed : I think a step is missing to explain how the authors establish the parameterizations from scale analysis and the budget equations. And the data used should be more detailed. I suggest the authors also support their arguments with the figures which are rarely quoted. p. 5256, line 15 : "Scale analysis ... proportional to  $V^2$ " : the proposed parameterization is interesting but I would like to have more details how it has been established. Figure 2 is useful because it shows the good correlation between the model (parameterizations) and the data but it could be also interesting to have the same figure as fig. 1 to see why a quadratic parameterization

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

(depending on the wind only) is not enough. p. 5257, line 6 : "... the magnitude of the flux also varies over a large range". As said before, I consider we don't have a lot of information about the data. I suggest the authors add a table or a figure summing up the range of values for each flux and the corresponding meteorological conditions and height of measurements. p.5257, line 7 : "In contrast, ..." Is this sentence deduced from the observations or scale analysis? I would like to see a figure that support this result.

3.2 comparison with parameterizations In my opinion, this section is not easy to follow because the structure of the text does not follow the figures. Actually the comparisons are presented flux by flux whereas the text develops following the comparisons for each parameterization. The text syntax is not appropriate with the figures presentation. I suggest the authors improve that point. p. 5257, line25 : the authors should quote the corresponding figure to support their sentence. p. 5258, line 4 : it seems to me that it is the contrary : If the authors are talking about the F96 parameterization then, according to fig. 4, the modelled fluxes are under-estimated with this parameterization compared to the observations. p. 5258, line 12 : what does mean "variable" in this sentence? Do the authors have an idea of the causes of the variability? It should be interesting to recall us the validity range of the parameterizations used and to more detail these parameterizations? As the authors propose a parameterization for the sensible heat flux depending only on the temperature difference, I suggest they display a figure of SHF=function (DT) instead of function (V). p. 5259, line 15 : SHF instead of SFH. p. 5259, line 15 : "The reason ..." : Do you have SST measurements to prove your statement? In this case, it would be very interesting to show them. p. 5259, line 20 : I think that table 1 could be quoted earlier in the paper. I also suggest the authors sum-up the same information for all the fluxes.

Do the authors think that the comparisons of TMF are better with the F96 parameterization because of the iterative process on stability in the F96 algorithm? How do they explain the large differences with M97 and K02 for TMF which is usually easier to

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

estimate than SHF and LHF?

---

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5251, 2006.

ACPD

6, S1943–S1946, 2006

---

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

S1946

EGU