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Interactive comment on "Improving estimations of greenhouse gas transfer velocities by atmosphere–ocean couplers in Earth-System and regional models" *by* V. M. N. C. S. Vieira et al.

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The work presents several novelties, namely: (i) the proposed numerical framework, (ii) its application to couple atmosphere and ocean in Earth System Models, and (iii) demonstrating the strong impact of disregarding other important factors besides u10 when simulating the coastal ocean with a finer resolution. There are not any other published works presenting these aspects. It is enlightening that a few weeks ago both the French Mercator and the Portuguese IDL opened post-doc positions with the same objectives.

This is a concise article focusing on demonstrating the problem is real and proposing

our framework as a path to achieve the solution. We succeeded in both aspects. To reach a final solution, intermediate steps are required and the insights brought by them are valuable to the scientific community and worth being published. This way we can all share experiences, debate ideas and participate in the achievement of a good final product. The COARE algorithm is the most comprehensive framework modelling atmosphere ocean exchanges of heat and momentum. It spent 21 years publishing tens of progress reports with updates on the cool-skin, warm-layer, air- and water-side transfer velocities of mass, heat and momentum, iterative algorithms, etc.

We gladly verify the reviewer found none inconsistency in the modelling of the geophysical processes, namely the model development, data collection and its analysis.

Although well known to the respective scientific community, all symbols and related geophysical processes were nevertheless explained at first appearance and in several cases, more than once. They were always used exactly as in the tens of related literature and, in the more specific cases, exactly as in their original publications, whose reference was given.

We devoted 1 paragraph with 17 lines, more than $\frac{1}{4}$ of the results section, to the analysis relative to Figure 1, where we made clear how our framework represents an improvement from Wanninkhof (1992) formulation. The used roughness length formulation, by Taylor and Yelland (2001), the atmospheric stability formulations, by several authors but based on the works by Businger et al (1971) and Dyer (1974), the kw and kbubble formulations, were presented, calibrated and validated by their respective authors.

We revise grammar and syntax, correct "form" and "later" and add video captions.

Interactive comment on Biogeosciences Discuss., 12, 15901, 2015.