

Interactive comment on “Parameterization of atmosphere–surface exchange of CO₂ over sea ice” by L. L. Sørensen et al.

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I have attached the response to all three review

Response to review 1: The original objective of this paper was to discuss the application of the resistance parameterization over the sea ice and the deviation and parallels to the application over terrestrial areas in order to suggest a conceptual model for air-ice exchange. However it seems that our attempt failed, thus we will write this more clearly in the introduction and also expand the discussion on this subject. It is difficult to really evaluate how well this parameterization performs, since it is basically just a conceptual model. However we will discuss in more details where the largest uncertainties are, when it comes to this parameterization and of which parameters we need more detailed information. Page 3902 Line 16: This is the TCO₂ in the tank
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(thus they mean surface water). This will be made clear in the rewritten manuscript. Page 3903 Line 6: We will modify the sentence to include resistance theory. Page 3903 Line 12: We will include a sentence on how wind is influencing the ice on a larger scale. Page 3907/8: Equation 9. The reviewer is absolutely right. There is a sign problem, but after checking carefully we found that the minus is missing in equation 4 ($F = - (c - c_0) / (R_a + R_b + R_c)$) This is changed now and we thanks the reviewer for paying our attention to this. Page 3010 Line 1-2: We have clarified that the “good agreement” refers to the study by Sørensen and Larsen. Page 3010 Line 5-7: We have now analyzed this further and found that the stability corrections were small, so we are now estimating the flux based on a mean flux from three different estimation techniques (eddy covariance, inertial dissipation and the Cospectra peak method, introduced by Sørensen and Larsen) Page 3916 Line 6-9: We have expanded the conclusion to clarify especially line 8 and 9. Page 3901 Line 17, 19, 26 is changed according to suggestion Page 3902 Line 7: is changed to “studies addressing...” Line 11 and Line 27 is changed according to suggestions. Page 3914 Line 12: The sentence is changed and it now says that the uptake is increased Page 3903 Line 4-7: the sentence is changed according to the suggestion. Page 3905 line 25: The spelling is corrected Page 3914 Line 2, 8, 9, 13 24 are corrected according to suggestions.

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/7/C2560/2013/tcd-7-C2560-2013-supplement.pdf>

Interactive comment on The Cryosphere Discuss., 7, 3899, 2013.