

## ***Interactive comment on “Variability of air-sea gas transfer velocities in the Baltic Sea” by Leila Nagel et al.***

### **Anonymous Referee #2**

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The article presents a comparison of data obtained during 3 measurement campaigns in the Baltic Sea, using the active thermography method, to investigate the variability of the transfer velocities in field conditions, with data from Ho et al., in which the dual trace method was used. In addition, data from two measurement campaigns using the Radon deficit method were used. During the Baltic cruise heat transfer velocity was measured. The authors scaled heat transfer velocities to gas transfer velocities using different exponent of Schmidt number (determined in laboratory conditions) and compared the measured transfer velocity with the existing parameterization on gas transfer velocity. As a factor influencing the gas transfer, the authors used fetch and surface active material. These are very interesting study which are very useful and fills the gap for our understanding of air-sea interaction but a few more information will be

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welcome in order to complete the results. I recommend the article for the publication after a few changes and some more work.

Major comments: 1. The purposes of the manuscript is not clearly formulated. The title suggests that the purpose was to demonstrate how the air-sea gas transfer varies in the Baltic Sea, but inside the text suggests other objectives. Is the objective to compare active thermography method with dual trace method? Or is the purpose to prove that fetch and surface active material have a significant effect on the gas transfer velocity. Or is the purpose of proving that in the transfer velocity study should we use the Schmidt exponent dependently on water conditions? 2. The article in its current form-short, specific information on a given topic, without any extensive descriptions of the transfer velocity - is attractive for scientists who are interested in this topic. But for scientists who are not familiar with this topic, this article may be embarrassing, because they will learn specific results from the use of a given measurement technique, but will not know anything about why this is happening. This article is of a purely technical nature rather than a scientific article. It is important to add more information about the different methods that are used for study transfer velocity or more information about the gas transfer velocity itself and in the Baltic Sea. 3. Here are more specific comments: a. The Introduction should be extended about information described above. A few sentences about various technique to study gas transfer. What is the ACTF method characterized. Some more information about correlation  $k$  with  $u^*$ . Perhaps more information about variability of air-sea gas transfer velocity in the Baltic Sea, as the title suggested. b. More information why mainly wind speed is taken into consideration in air-sea study and why we should add more factors. Not only write the other factors. c. P2L6 ...the active controlled flux (CFT)... d. P2L 9 add references after: A wealth of studies (references) have shown.... e. P3L27..the active controlled flux (CFT) f. Please exchange para 4.1 with 4.2 for better organization, as you mention in presence para 4.1 cruises which are introduce in presence para 4.2 g. P7L29 - ...from 25 April 2009 until 7 May 2009 on the German....

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h. P9L11 During most of the FS Alkor campaign in 2010. .... this should be after Fig. 5 where you introduce this cruise

i. The results and conclusion are very short when they are the most important part of the article. Maybe comparison with other data from the Baltic Sea.

j. We know that at higher and lower wind speed gas transfer are limited so maybe more about that.

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