Air-sea exchange is one of the major uncertainties in understanding the global mercury cycle. The presented study improves on previous work by Kuss et al. in the Baltic Sea. Based on high resolution measurements it gives novel insights into important processes and short term variability of air-sea exchange. This is a valuable contribution to research on mercury.

Moreover, the paper is well written, the methodology robust and the measurements trustworthy.
I support publication of the manuscript after a few issues are addressed:

Major points:

Page 7 line 1-2: Please discuss the error introduced by the usage of average wind speeds as compared to high resolution (e.g. hourly) data.
As wind speed is squared ($0.222\ u^2 + 0.333u$) even using the median instead of the mean might have a large impact on the calculated fluxes.
I think you need at least estimate the error due to the averaging. Especially in early autumn when Hg^0 concentrations are still high and storms are more common.

Page 11 line 26-31: This section needs to be clarified:
The 1.73Mg Hg^0 annual evasion is supposed to be the estimate for the whole Baltic Sea? So the Bothnian Sea, Bay of Bothnia, Bay of Finland, Bay of Riga have a combined Hg^0 flux of only 730 kg?

How do you extrapolate the data to get to this conclusion? This leads to many unanswered questions and I would ask you to give more information on the extrapolation method and its uncertainty (e.g. Do you consider the effects of sea ice? Do you have measurement data for the Bay of Riga and Bay of Finland? What is the effect of average wind speeds?)

Minor points:

Page 1 line: I suggest that you also cite the HELCOM reports (2007 & 2011) on which the Soerenson et al. riverine influx estimate is based on.

Page 2 line 24: “The aims are” instead of “The aim were”
This clarifies that you are talking about the actual study and not a previous one.

Page 5 line 13: Please clarify: “of ±3% only in a Hg^0_{wat} concentration range of 14–38 ng m^{-3}”
To me that means that the 3% error was only validated for concentrations in the range of 14-38ng/m^3. If this is the case the question arises how large the error is outside this range. Otherwise I suggest to drop the word “only” which makes the sentence clearer.

Page 8: lines 5-6: This finding is based on average wind speeds. How well does this capture storm events?

Page 9, lines 25-27: This is a great result. It would be interesting if you could estimate the impact of an upwelling event on the mercury flux that would normally occur without this event. This could also be a source for inter-annual variability due to shifts in wind fields.

Page 11 lines 21-22: You identify a 60% difference in calculated air-sea flux due to differences in parametrizations. How important do you thing the inter-annual variability is in comparison. And how large is the effect of averaging wind speeds in comparison?

Page 11 line 26-31: I suggest that you compare the results of your extrapolation with modelling results which can be seen as a more sophisticated way of extrapolating measurement data (e.g. Soerenson et al., 2016; Bieser and Schrum et al., 2016).

Page 11 line 37: fluxes instead of flux.

I agree with reviewer #1:

"Data availability: I strongly encourage the authors to make the un-averaged data available, in addition to the averaged data. Un-averaged data will be of greatest interest to modelers who want to compare simulated and measured values."