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Atmospheric Measurement Techniques Discussions

Interactive comment on "Determining the sea-air flux of dimethylsulfide by eddy correlation using mass spectrometry" *by* B. W. Blomquist et al.

Anonymous Referee #2

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This manuscript describes the instrument, procedure, and data analysis routines used to measure the air-sea flux of DMS with the eddy correlation (EC) technique. This work is important because there is only one other full DMS air-sea EC flux measurement description published, as well as only brief descriptions of CO2 air-sea EC flux methods published. These techniques are extremely useful for characterizing the air-sea gas transfer coefficient as well as understanding the biogeochemical cycling of climate active trace gases, but involve complicated technical and analytical measures to produce a flux number. I only have minor revisions to suggest. I do want to note that this work is similar to Marandino et al., 2007, although there are some important distinctions between the two. This work presents alternatives in data corrections, instrument design, and a more detailed discussion of error analysis. It is, therefore, scientifically significant and deserves publication in AMT Discussions.

Specific comments:

Pg. 1974, line 16- ". . .rapid changes in mean DMS mixing ratio. . .", DMS has a lifetime in the atmosphere on the order of one day while the flux measurements are made on the order of one hour. What rapid changes have been seen and are they really significantly affecting the measured flux?

Pg. 1974, line 18-"In addition, bias in surface flux estimates. . .", It seems that this statement is in direct contrast to the previous statement that says rapid changes in mixing ratio affect the measured flux. Maybe I am missing the difference between the changes of DMS mixing ratio with height vs. the changes in the mean DMS mixing ratio?

Pg. 1975, line 15-should maybe include references to Simo and/or Saltzman manuscripts (I believe Simo, 1998 and Simo and Dachs, 2002, Simo and Pedros-Alio, (year?), Cooper and Saltzman, 1991, deBruyn et al., 2002) in the list of GC-FPD and GC-MS DMS measurements

Pg. 1976, line 11-missing a Hintsa gradient flux reference (Hintsa et al., 2004)

Pg. 1976, line 24–missing a reference to McGillis et al., 2004 and there are two new references to CO2 open ocean EC, Taddei et al., 2009 and Miller et al., 2009. EC has also been performed at sea for acetone, Marandino et al., 2005 and Taddei et al, 2009.

Pg. 1976, line 27-the reference years for Marandino are wrong. . .should be 2007, 2008, and 2009

Pg. 1976, line 27-29-have all of these campaigns resulted in published manuscripts?

Pg. 1977, line 26-typo, 6H6 subscripted

Pg. 1979, Section 2.2-There is no discussion of the potential to saturate the DMSH+ signal (i.e. no increase in DMSH+ counts with corresponding increase in DMSH+ mixing ratio) in the presence of insufficient H3O+ (very dry conditions of a clean air gen-

erator or low relative humidity, or many trace gases in the air stream competing for the proton from the hydronium ion). Have the authors experienced this? It seems that lines 23-25 on page 1980 are referring to this phenomenon but it is not explicitly stated.

Pg. 1981, line 27–stipulate that they are referring to counting (Poisson distribution) statistics when they say "...theoretical noise..."

Pg. 1982, line 10–Do the authors record their mass flow controller (mfc) output signals?

Pg. 1982, line 19-The permtube is brought to the field for in situ standard cylinder calibration. This device would have to be shipped, presumably, without gas flowing over it and without temperature control. How trustworthy is field calibration using the permtube after such shipment? Do the authors weigh the permtube at sea to check stability?

Pg. 1982, line 20-Figure 12 is referred to out of order

Pg. 1983, Section 2.5-make sure to define all components of equations (An and R are not defined explicitly stated anywhere in the text)

Pg. 1985, line 25-an independent synchronization pulse between the two data acquisition systems can be used to circumvent problems with clock synchronization

Pg. 1985, Section 3.2-there is no mention of the pipeline delay in the sonic anemometer data stream. Do Gill anemometers have a pipeline delay, like Campbells?

Pg. 1986, line 2-Figure 7 is referred to out of order

Pg. 1986, line 1-Is there a reference for the lag correlation procedure employed here?

Pg. 1987, line 10 and Figure 5-I don't quite understand this. In order to compare measured fluxes to Kaimal et al., 1972 you must normalize your measured cospectrum to the covariance and plot with the idealized Kaimal potential temperature cospectrum computed using the equation in the Kaimal et al., 1972 publication.

Pg. 2000, line 6-It is true that low frequency noise will average out when all records are considered together. However, I do not understand how the authors compute their k values for a k vs. U plot? Are the k values computed over one hour or less? Do the k values contain contamination from low frequency noise?

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1973, 2009.