

Interactive comment on “Monitoring compliance with sulphur content regulations of shipping fuel by in-situ measurements of ship emissions” by L. Kattner et al.

Anonymous Referee #1

Received and published: 4 June 2015

General comment This paper describes a large set of ship emission measurements carried out downwind of by passing ships in the Elbe river. The method has been developed and used within the scientific community during the last 10 years. The paper is well written. It has focus on compliance monitoring and considering that the shipping sector has been forced to decrease their emission by an order of magnitude from 1 % in 2015, by running 0.1% sulfur fuel content instead of 1 % on northern European waters, these data are very interesting, since they correspond to one of the first data sets. For the reason above I believe the paper should be published. The paper should however be improved in the technical discussion regarding the quality etc.

C3250

Specific comments Row 28, p 11033: The author mentions MGO but not the fuel many ships seems to be using, i.e. desulfurized heavy fuel oil. Row 7, p 11036: We have some own experience on similar measurements showing that 1 minute resolution is somewhat slow and that ship plumes drifts by rather quickly. It would be good if the author can discuss /elaborate on this issue further and include in the uncertainty discussion.. Row 13, p 11036: The SO₂ fluorescence technique has cross sensitivity to NO. Has this been assessed and corrected for? Row 3, p 11037: The LICOR instrument is a rather nonlinear instrument. The spa calibration carried out was rather crude from 306 to 990 ppm corresponding to a too large interval in my mind, since the instrument is nonlinear in this interval. The author should elaborate on this issue in the uncertainty discussion Row 3 to row 16, p 11039: The problem of obtaining good CO₂ baseline values in a measurements site inland with long averaging time should be discussed. Also the nonlinearity of the CO₂ sensor (see above).

Row 3 to row 16, p 11039: Since ships today run on low sulfur fuel content the precision in the SO₂ measurement, and the baseline assessment etc, is more difficult since there is very little signal, especially for small ships. This should increase the SO₂ uncertainty to higher than 15-30% which is the typical uncertainty found in other studies for instance by Balzani et al. Also the threshold of 0.16% is questionable in my mind for the same reason. Row: 27 p 110039; I believe the referred paper (Beecken 2014a) is about airborne measurements on the open sea while here the measurements is an inland measurements. . The authors should discuss this. Row 12, p 12: These data are presumably the first published in ACP for 2015 data but to my knowledge there are phd dissertations including similar results. Row 17, p 11041: Even though the oil price is so low that MGO now has the same price as HFO last year the difference between the two still remains.

Figure v2. Is the data NO (as written in labels and tex) or NO_x. Why not NO_x?

Technical Corrections The paper is well written in most places. Row 15. P 110033, insert which between and which are basically Row 9 p 11034: change to “ and, when

C3251

suspicion is raised, take ...”

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 11031, 2015.

C3252