

**Reply to Reviewer 2 comments for: Segmented flow coil equilibrator coupled to a Proton Transfer Reaction Mass Spectrometer for measurements of a broad range of Volatile Organic Compounds in seawater**

Many thanks for the thoughtful comments from this anonymous reviewer. Please see our responses below. Reviewer comments are in italic and replies in normal font. The changes to the manuscript are presented as figures taken from the manuscript with the changes made indicated by red track changes.

*References: Please check the form of references shown in the text. For example, "Blando & Turpin, 2000" (page 1, line 28) should be shown as "Blando and Turpin, 2000", and "de Bruyn, Clark, Senstad, Barashy, & Hok, 2017" (page 2, line 43) should be shown as "de Bruyn et al., 2017".*

Suggestion accepted.

*Page 2, line 35 Please add the suitable references.*

Suggestion accepted.

Current estimates of air–sea VOC fluxes and the cycling of VOCs in the oceans have been limited in part by our ability to measure these compounds in [the surface seawater phase](#). [For example global budgets for acetone highlight the uncertainty of oceanic emissions](#) (Fischer [et al.](#), [Jacob, Millet, Yantosca, & Mao](#), 2012). [A more recent sensitivity analysis of this model stresses the importance of accurate oceanic mixed layer concentrations on the global acetone budget, especially in the Southern Hemisphere](#) (Brewer [et al.](#), 2017).

*Page 3, line 88 The response time of 10 min is only for isoprene, not for the other compounds such as acetone, methanol and so on.*

Suggestion accepted.

to PTR-MS to measure four different VOCs at a time (Williams [et al.](#), 2004). A bubbling-type equilibrator has also been developed for underway measurements of a range of dissolved VOCs with PTR-MS (Kameyama [et al.](#), 2010). The large volume of the bubbling equilibrator (i.d. 15.2 cm, height 100 cm) makes it very bulky and  
90 creates a long response time ([up to 18-19 min e.g. for methanol](#)~~about 10min~~). Moreover, the high-water flow requirement of this type of equilibrator ( $1 \text{ dm}^3 \text{ min}^{-1}$ ) is also less suitable for discrete measurements.

*Page 3, line93-102 Those explanations itself are generally well, but not suitable in introduction section. I assume that those sentences could be removed.*

Suggestion accepted. This explanation has been moved to section 2.1.

The design of our SFCE is shown in Fig. 1. The SFCE is coupled to PTR-MS for measurement of methanol, acetone (2-propanone), acetaldehyde (ethanal), dimethyl sulphide (DMS), isoprene (2-methyl-1,3-butadiene), benzene and toluene (methyl benzene). These gases cover a large ~~solubility~~ range of solubilities (see Sect. 4.2.13.2). ~~This, demonstrates demonstrating~~ the versatility of the SFCE. ~~Though, t~~ The main advantage of this equilibrator lies in its design. Briefly, the segmented flow allows for a large surface area for gas exchange, ample equilibration time, and so a high degree of equilibration. The simple headspace and water separation system allows for rapid drainage of the sampled water as well as separation of the headspace from water without spray or droplet formation. This ~~reduces the~~enables a fast response time ~~to below 1 min~~. Due to the ease of changing the water sample intake and low water flow ( $100\text{ cm}^3\text{ min}^{-1}$ ), the equilibrator can conveniently be used for both continuous underway and discrete measurements. The equilibrator is entirely made up of commercially available Polytetrafluoroethylene (PTFE) tubing and fittings, which should minimise adsorptive loss and make

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the equilibrator relatively inexpensive and easy to replicate. The constant flow of water and smooth surfaces should also reduce bio fouling and facilitate occasional cleaning.

*Page 10, line 334 Ionized toluene should be found in not only m/z 93 but also m/z 79 depending on the drift tube voltage. Did the authors find the fragmentation of toluene? m/z 79 is used to identify benzene amount, therefore, the authors need to care of existence of the fragmentation.*

Suggestion accepted. A sentence highlighting this uncertainty has been added to the manuscript.

fragment ion m/z 41 and 39 respectively. This is in general agreement with Schwarz et al., (2009). This fragmentation ratio increases with increasing drift tube voltage (see appendix). It is possible that some of the mass 79 measured here contains a contribution from fragmenting toluene. However, because the gas standard contains both it is not straightforward to evaluate the magnitude of this interference.

*Page 11, line 354 What is the ratio of “100 cm<sup>3</sup>n:100 cm<sup>3</sup>” here? Maybe typo?*

Suggestion accepted. The “n” here is used to emphasized that this is a normalized mass flow delivered by a mass flow controller. This has been highlighted on page 4, line 115-116.

