

Dear Authors,

A few relatively minor points to be addressed. A few comments below.

Abstract:

**Editor comment: Abstract should mention the analytical range of the instrument and compounds that can be measured.**

Response by authors: We have added the following sentence in the abstract:

*“ Here, we present a new System for Organic Fast Identification Analysis (SOFIA), which is a custom built fast Gas Chromatography – Mass Spectrometry (GC-MS) system with a time resolution of 2-3 min and the ability to quantify atmospheric mixing ratios of halocarbons (e.g. chloromethanes), hydrocarbons (e.g. isoprene), oxygenated VOCs (acetone, propanal) and aromatics (e.g. benzene, toluene, butanone) from sub-ppt to ppb levels.”*

Reviewer: P3, L30 – “In my experience, heated teflon line can be quite permeable, how do you test for contamination? e.g. TOGA has zero air introduced right at the start of the inlet as it enters the cabin.”

Response by authors (on AMTD): The contamination was tested in a similar manner. On board SOFIA a N<sub>2</sub> bottle (6.0) was frequently used for diagnostic purposes. This information has been now in the text.

**Editor comment: How do the inlet blanks look? This would be nice additional information. Perhaps a sentence or two describing this is in order.**

Response by authors: We have added the following sentence at the end of section 2.1.1:

*“Blanks that have been obtained in such manner contain no peaks unless a leak or contamination of the inlet is present. Therefore the N<sub>2</sub> cylinder has proven to be a reliable addition for both inlet testing and standby operation”.*

Section 2.8 9/35: Prior to each mission **(or flight?)**

Response by authors: Changed to “flight”.

Section 2.8 9/35: The instrument was turned **ed** on (power consumption ≈1000 W) and all gas cylinders were opened.

Response by authors: Thank you for the correction.

**Editor comment: Reviewer 3 asked for information regarding the start-up time for the instrument until it is ready for prime time. I agree that this is very useful information for an aircraft instrument and should be included.**

**(Please look for other such errors in manuscript. I ran across a few of them but did not document all of them)**

Response by authors: In our response to Reviewer 3 we have chosen to report the individual times needed along the startup procedure. The start-up time can be as low as 30 min but the exact start-up time until the instrument can produce quality data can vary. We have now included the following sentence to the section 2.8:

*“The minimum start-up time required is as low as 30 min but usually a full hour was required in order to produce reliable chromatograms, clean blanks and stable calibrations.”*

**Section 2.8 10/8: (seems that this paragraph should come first in this section)**

“The system was installed on board the HALO aircraft after its final configuration and certification. At first, a limited number of compounds (11) was monitored in order to ensure reliable quantification (Table 1). At the start of the OMO campaign, high sampling flows (100 sccm) resulted in inefficient water removal and hence poor and non-reproducible chromatographic peaks. The solution was to operate the system with a lower sampling flow (40sccm) and only at high altitudes where low dew point temperatures do not affect the sampling procedure. The sampling time was 1min so a total volume of  $40\pm 6$  ml was collected into the traps. During sample collection, the water trap temperature was set to  $-30\pm 0.3$  oC and the enrichment trap to  $-140\pm 4$ oC. During the sample transfer, the cryofocus trap was set to  $-160\pm 1$ oC. All traps were then heated to 120oC to ensure that all 10 volatiles were desorbed efficiently from each trap.”

Response by authors: Thank you for the suggestion. This paragraph is now first in this section.

**Editor comment: Is this still the case that the system can be operated only at high altitudes? If so, how high?**

Response by authors: This solution was chosen during the campaign due to the lack of time for in-situ tests as we wanted to minimize the risk of allowing water vapor to enter the detector. Post campaign tests have shown that under such flows the water vapor is efficiently retained by the trap. We have added the following sentence at the end of the aforementioned paragraph:

*“Post campaign tests (see section 2.7) showed that under such small sampling flows the water trap sufficiently retain water vapor and therefore the instrument can be operated even under ground conditions.”*

**Figure 2: The inlet figure is great but not described in the text. Please describe it.**

Response by authors: We have added the following sentences in the main text:

*“Air was drawn into the aircraft through a forward-facing Trace Gas Inlet (TGI; Enviscope GmbH) (Fig 2, Wendisch et. al., 2016). The TGI body is constructed by aluminium (WL.-Number 3.4364, T7351) and continuously heated to 40°C. Inside the TGI, PFA tubes (1/2' for the horizontal external tube and ¼' for the perpendicular tube) are used for the air streams. The main air flow is parallel to the flight direction and the inlet pump of SOFIA draws air from the T-piece inside the TGI, perpendicular to the flight direction. In the cabin,...”*

**2.7.2 9/25: This increase can be attributed to production by ozone reactions occurring with other 25 species that are present in the multicomponent gas standard – how do you know this is true? – did you try zero air + ozone?**

Response by authors: Yes we did as described in a different paragraph (P9 L12-15). In order to avoid similar misconceptions we have added the following sentence:

*“This increase can be attributed to production by ozone reactions occurring with other species that are present in the multicomponent gas standard, as the supply of ozone enriched zero air did not result in production of OVOCs.”*

Additional comment by the authors: In the acknowledgment section we have added the following sentence: *“We thank Eric Apel and Aaron Johnson for helpful discussions during the preliminary design phase.”*

Final remark by the authors: We would like to thank the editor for choosing suitable reviewers and for providing us with insightful feedback. We believe that the very fruitful discussions and revisions suggested during the review process have substantially improved the quality of our manuscript.