Review of Glowania et al., AMT (2021):

This manuscript presents a comparison of HCHO measurements taken at the SAPHIR chamber over several experiments. The analysis focuses on the performance of two commercially available HCHO instruments using Hantzsch (Aero-Laser GmbH, AL4021) and CRDS (Picarro, G2307) techniques and a DOAS instrument. The authors conclude that zero-corrected measurements are in agreement within stated uncertainties for all measurement techniques. The subject matter is appropriate for AMT. Specific comments are enumerated below.

Specific comments:

Line 64-66: The LIF technique does not require a fiber laser (see Hottle et al., 2009), though a fiber laser is often used. Please include Cazorla et al., 2015 as a reference.

Table 1. This reads as an assessment of the measurement methodologies (Hantsch/CRDS/DOAS), though the figures given refer only to the specific instruments used here. I suggest titling each column with the instrument model.

Line 186. Please provide the name of the reagent used for HCHO scrubbing.

Line 206. It is unclear to me how the reproducibility of 2% on the titration and a 3% uncertainty in flow measurements adds together to get an 8.5% measurement accuracy. Please clarify.

Line 214. Please quantify “close”.

Line 223. It is unclear where the stated accuracy of 10% comes from. It is not derived or demonstrated in this study. The referenced paper (Russel et al., 2020) discusses the Picarro instrument uncertainty in the supplement. It states “The CRDS from Picarro is factory calibrated and has a precision of 1.2 ppb + 0.1% of the reading for HCHO readings, with no dependence on humidity levels […] For the determination of absolute concentrations of HCHO, for instance during chamber testing, the accuracy is ± 10%”. Glowania et al. show a humidity dependence and gives a higher precision. It seems the two papers are not in agreement, so it does not seem that the accuracy in the reference given can be applied here.

Line 253. The DOAS method relies on cross-calibration with a Hantzsch. While two different Hantzsch instruments are used, is it possible that any systematic offsets related to the Hantzsch methodology could influence DOAS observations? I suggest showing the data used in the regression analysis discussed in lines 248-252.

Line 263-265. Again, it is unclear how the 6% accuracy is calculated. More details are needed. Does it take into account the uncertainty in the absorption cross section from the regression described in lines 248-252?

Figure 1. I suggest showing HCHO concentrations using each method in panel 2, rather than a second day showing the same thing as panel 1.

Line 291. If the Picarro specifies an anticipated zero drift of 1.5 ppb, I think the offset should not be classified as a “bias”, but rather a zero-point that needs to be taken into account. The offset of the Hantzsch instrument is not called a “bias”.

Line 366: Is the intercept -0.13 ppb?

Lines 406-416. It is unclear how the main points of this paper can be applied to future deployments of the CRDS method. How often does a HCHO zero need to be taken with the CRDS instrument if ambient H2O varies? Could the HCHO zeroing system used for the Hantzsch be applied to the Picarro? Can the authors reassess their observations using the new software?

Throughout. The authors switch between 1σ and 3σ LODs. A consistent reporting methodology would improve the readability.