

## ***Interactive comment on “The novel HALO mini-DOAS instrument: Inferring trace gas concentrations from air-borne UV/visible limb spectroscopy under all skies using the scaling method” by Tilman Hüneke et al.***

### **Anonymous Referee #1**

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The manuscript describes the mini-DOAS instrument that has already been operated in a number of science campaigns onboard the German High Altitude and Long-range research aircraft (HALO) together with the so-called "scaling method" to infer trace gas mixing ratios from the mini-DOAS limb measurements. The paper is generally well written and provides an important reference for the mini-DOAS instrument and in particular its data analysis. I recommend publication in AMT after consideration of the following – mostly minor – comments.

Specific comments

C1

As the instrument has already been flown on a number of science campaigns and this paper gives only a few selected examples, I suggest to include a table listing deployments of the mini-DOAS instrument on HALO campaigns so far.

p1.I3: please spell out HALO as “German High Altitude and Long-range research aircraft (HALO)” when used for the first time and move the URL reference from the abstract to the introduction section.

p2.I1: sentence ends early

p2.I6: better either give an earlier reference for DOAS as well, or explicitly indicate that Platt and Stutz (2008) is a recent review of DOAS and not the original reference

p2.I22: "German GV" -> "German High Altitude and Long Range Research Aircraft (HALO), that is based on a Gulfstream G550 jet"

p2.I35: what exactly is meant by "celestial" here?

p3.I29: “to” -> “to be”

p4.I11: what exactly does "latter" here refer to? Only CCMs or CTMs and CCMs?

p5.I18: insert "elevation angles"

p5.I20: why "skylight" and not simply "light"? I know its picky, but in general there may be other light sources than just skylight.

p6.I9: Can you explain briefly why surface temperatures are important here and not the much cooler upper tropospheric / lower stratospheric temperatures at cruise altitude?

p7.I10: any reference to BAHAMAS ?

p9.I1: “Polstracc” -> “POLSTRACC”

P9.I14: “Acridicon” -> “ACRIDICON”

p10.I27: What is “EA”? Elevation angle?

C2

p11.l6: "Fairo" -> "FAIRO"

p11.l7: "for measuring" -> "for in-situ measuring"

p11.l16: not sure if "all 13 flights" is still relevant here, as many more flights on more recent campaign have been performed with FAIRO

p12.l17: horizontal resolution is not well defined for a Lagrangian model. Please give more detail what this refers to.

p12/13: EMAC: Maybe include a few sentences about EMAC's chemistry scheme - in contrast or comparison to what has been mentioned for CLaMS.

p14.l12: Suggestion: Say again explicitly that SCD\_X and SCD\_P are measured by the mini-DOAS, the alpha are from a model and [P] is measured in-situ. (If that is what you are doing.)

p20.l11: better be a bit more specific of where no elevated BrO concentrations are observed. I assume this statement does not refer to the Antarctic boundary layer?

Caption Fig. 2: Suggestion: Include in the caption date, location and campaign of sample measurement

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