Comment on acp-2021-378
Anonymous Referee #2

De Smedt et al. give a very detailed summary of TROPOMI HCHO results, relative performance and uncertainty relative to OMI, and validate the HCHO observations against a number of MAX-DOAS instruments. TROPOMI is making the newest state-of-the-art HCHO measurements from space, and the data are, and will be, widely used. The paper is written by the algorithm developers and is very thorough, and will be of interest to a wide range of HCHO data users.

The paper is very long. In fact, I think it could almost have become two or three papers (TROPOMI/OMI comparisons, validation, and shipping lanes). However, it’s in excellent shape as is, and I recommend publication in ACP. I only have a few very minor comments.

An (optional) general suggestion would be to change the title somewhat. I was expecting a purely validation paper, but the first half is almost entirely assessing the instruments and looking at relative OMI and TROPOMI performance. I wonder if the current title could cause the paper to be passed over by people who don’t want to read another validation paper, but are still interested generally in TROPOMI details and TROPOMI vs OMI performance. Maybe something like: “Comparative assessment of TROPOMI and OMI formaldehyde observations and validation against MAX-DOAS network column measurements”. There is a lot of useful information in here that stands alone without the validation analysis.

Specific Comments

Line 53: Add time period for previous sensors for context, for example: “previous sensors (X years)”

Line 103: Suggest change “high emission” to “high concentration” or similar (since emission maybe be from elsewhere, not emitted at site)

Line 187: I’m a bit confused about the correction introduced here... maybe I just need a more detailed explanation. I gather it is applied to TROPOMI and OMI for a more direct comparison throughout this paper? Are there possible negative consequences of doing
this, for instance in the interpretation of results by users, that need to be discussed here?

**Technical Comments**

Line 243: Better to say "Throughout the paper" instead of "Along the paper"

Line 252: Slightly confusing about how k is applied... Is the equation \( k \times \text{median(..)} \) and text is supposed to be \( k=1.4826 \)?

Line 283: Change "to detect" to "the detection of"

Line 445: missing statement after "see"