Author's response

We would like to thank John Orlando for the management of our manuscript. The author's comments (black), the referee's comments (grey) and our replies (blue) are listed below. All resulting changes are highlighted in the new version of the manuscript, including linguistic corrections.

Editor:
Thank you for re-submitting your manuscript. As you are aware, the reviewers have made further (minor) suggestions, as listed below.

- Page 8 line 8 should be 4.5 × 10-5 and 7.8 × 10-5?

Correction made.

- According to eqn 4 and 5, when [OH] R(OH) is equal zero, should the loss term J+k[OH] also be zero? It looks to me that the intercept in figure 4 is basically from the dry deposition term.

I believe that you have addressed the issue of the intercept in Figure 4 already, but please have another look in case more can be done to clarify.

We agree that the loss terms j(HCHO) and $k_{HCHO+OH}$ are basically zero when OH × R(OH) equals zero, thus, the intercept can be interpreted as additional loss e.g. due to dry deposition (Eq. 4 & 5) or as additional source of HCHO based on the PSS assumption.

We would like to highlight, as already addressed in the response to Referee 2, that we included the dry deposition based on literature values and ERA5 results. Based on this calculation the dry deposition only accounts for 8-19% of the intercept. Although we cannot exclude the underestimation of the dry deposition, we think it is more appropriate to use the intercept as an indicator for additional HCHO sources (not necessarily related to OH chemistry). The interference of other primary HCHO sources was likely during the measurements around the Arabian Peninsula and high concentrations of O_3 and unsaturated hydrocarbons were detected in the Arabian Gulf. We address this issue more clearly on p13 line 19-30.

In addition, we improved the discussion of the results in the new version of the manuscript.