

Response to Reviewer 1 comments

We thank the reviewer for the very positive comments and for the suggestion on the section on the non-methane hydrocarbon section. We agree with the point about the ratios and have made the following changes and additions to the first paragraph of section 4.2 (indicated in coloured text):

Non-methane hydrocarbons (NMHC) and other volatile organic compounds in the plumes were determined from whole-air flask samples by offline analysis (Hopkins et al., 2011; Lidster et al., 2014). NMHC content was dominated by light alkanes ranging from >20 ppb ethane to <1 ppb benzene and <0.1 ppb higher monoaromatics. A close relationship between elevated CH₄ and NMHCs (up to C₅) was observed in plume samples (Figure 7) with near consistent ratios. It is noteworthy here that the NMHC ratios showed slight anti-correlation with methane mixing ratios. For example, the ethane to propane ratio was found to vary from 2.7 - 5.5 down to around 2 at corresponding methane mixing ratios between 1871 and 2022 ppb. The relatively small number of observations makes it difficult to state with certainty whether the apparent relationship is indeed statistically significant or not. What remains clear is that the absolute mixing ratios of methane and the lightweight NMHCs are well correlated. The plume was dominated by short chain (<C₄C₆) linear and branched chain alkanes and some larger monoaromatic compounds, with up to five alkyl groups substituents attached to the benzene ring. No polycyclic aromatic compounds or oxygenated species were observed in any of the samples.

We have also changed figure 7 as suggested so it now shows which samples came from which flight.