Atmos. Chem. Phys. Discuss., referee comment RC2
https://doi.org/10.5194/acp-2022-720-RC2, 2022

Comment on acp-2022-720

Anonymous Referee #2

Referee comment on "Disentangling methane and carbon dioxide sources and transport across the Russian Arctic from aircraft measurements" by Clément Narbaud et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-720-RC2, 2022

General comments

The paper tries to capture CH4 and CO2 characteristics in Russia with several observation flights in September 2020. Using tracer gases (CO and O3) and footprint analysis, the authors investigated the cause of variation for the gases. Observation over Eurasia is limited, particularly aircraft observation; thus, the data is valuable for this research field.

However, although the data could be used to validate any transport model output, a snapshot of one month's data is difficult for meaningful analysis for GHG research. I need clarification on the new findings. In some chapters, statements are too ambiguous and contain too many guesses without probable evidence.

Specific comments

L378-379: Then, what is the reason for CO_2 enhancement?

L379-380: Any explanation is needed for the different tendencies between low and high.

L380: What is the meaning of 8.5 ppb CH_4/ ppm CO_2?

L458: Please rephrase the sentence.

L462-463: Why no simulated wildfires contribution?

Technical corrections

Figure 1: Letters, mainly yellow, are too small.

Figure 2: Numbers on the aircraft are too small. I need help finding numbers 15-20. The indication for 2-6 is not necessary.

Figure 4: The data from Barrow can be shown here as well.

L277: “CO2, CH4” -> “CH4, CO2”

L288: “1960 ppb” -> “1990 ppb”?

Figure 8: Y-axis for (a) and (c) must be CO [ppb].

Figure 10, 11: The axis for altitude is lacking.

e.g. L399, L514: Subscript for CH4 does not done.

L569: “Anokhin” -> “Antokhin”?