Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-437

Anonymous Referee #2

Referee comment on "Integrated airborne investigation of the air composition over the Russian sector of the Arctic" by Boris D. Belan et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-437-RC2, 2022

Review of Integrated airborne investigation of the air composition over the Russian Sector of the Arctic by Boris Belan et al.

The paper describes measurements of traces gases, aerosol properties and ocean extinction coefficient from an aircraft campaign in the Russian Arctic in Sep. 2020.

The research plane was well equipped and the presented data is valuable and well suited for publication.

The aim of this work is to introduce the measurement campaign and the data. Hence, the paper is a little weaker on the interpretation of the findings. However, given the wealth of data (and the length of the article) I am completely fine with this.

I only found a few minor comments, listed below. Generally the paper is well-written and clearly structured.

Introduction

Lines 51/52: you may give the keyword “Arctic amplification”

Instrumentation:

This is a well equipped aircraft for relevant measurements. Could you describe in 1 or 2 sentences what is meant by "with good resolution" in line 170? (e.g. sampling time, insecurities …)

Line 265: please write "laser induced fluorescence" to introduce "LIF" at first use

Fig 10: does Karskoye mean Kara Sea? Could you clarify?

Discussion on origin of CH4 line 465 ff: Did you consider that the CH4 may have originated from the ocean? See e.g. here:

https://phys.org/news/2021-03-east-siberian-arctic-ocean-elevated.html

If you had seen higher CH4 over lakes in tundra compared to the Arctic Ocean I would be convinced. Fig 12 (hysplit) is good from a methodologic point of view; however, as the sources of CH4 are the ground (land or sea) I am not sure here, whether your reasoning is complete. – Do you have any idea how in (e.g.) Sabetta region the gradient of CH4 in boundary layer looks like when flying from the tundra towards the ocean?

Line 599: I do not understand the sentence: A relatively small number of samples is caused (or impaired?) …

Fig 19: can we understand the high values over Chukchi Sea?

Caption of Fig 20 I would repeat in the figure caption that one high data point has been omitted.

Line 665: good correlation between scattering and BC. I see this for Arkhangelsk and Tiksi and this is indeed remarkable. But would we expect generally a good correlation between those quantities? I am not sure on this.