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Comment on acp-2021-1018

Thorsten Bartels-Rausch (Editor)

Editor comment on "Summer variability of the atmospheric NO_2 : □NO ratio at Dome C on the East Antarctic Plateau" by Albane Barbero et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1018-EC1, 2022

Editor comment on «Summer variability of the atmospheric NO2:NO ratio at Dome C, on the East Antarctic Plateau»

The work adds to our knowledge on NOy chemistry and the importance of snow cover. It presents new and novel data (time frame), applying a new method. Based on one referee comment and my own editor comment (see below), I'm happy to accept the manuscript for publication after minor revisions.

Page 2, line 35. Consider stating the wavelength regions
Page 3, line 40 Consider bullet list to increase readability.
Page 3, line 64: interference. Please explain in more detail and or give reference.
Page 4, line 74 please define Leighton's relationship.
Page 4, line 80. At the end oft he introduction, I'm a little puzzled about the novelty of the work, could you rephrase that paragraph to make it clearer.

Page 10 line 205 and page 12 line 235 and in between:
This is a very interesting section. I find the time lag between NO2 and NO interesting. Could you argue a little on this? Is this explainable by gas-phase kinetics (would surprise me). Another reason for time lag are of course different residence times in the porous snow after production there. Transport through snow can be slowed due to interaction with the snow interface like adsorption. Bartels-Rausch, T., S. N. Wren, S. Schreiber, F. Riche, M. Schneebeli and M. Ammann. "Diffusion of volatile organics through porous snow: Impact of surface adsorption and grain boundaries." Atmospheric Chemistry and Physics 13(14): 6727-6739.(2013). However, both NO2 and NO are not adsorbed by snow (Bartels-Rausch, T., H. W. Gäggeler and M. Ammann. "The adsorption enthalpy of nitrogen oxides on crystalline ice." Atmospheric Chemistry and Physics 2(3): 235-247.(2002)). This links nicely tot he discussion of RO2 impact on the oxidation. RO2 might be expected be adsorbed to now more than NO2 (similar to HNO4: Ulrich, T., M. Ammann, S. Leutwyler and T. Bartels-Rausch. "The adsorption of peroxynitric acid on ice between 230 K and 253 K." Atmospheric Chemistry and Physics 12(4): 1833-1845.(2012)) and if produced in the snowpack be released later. Would this make sense? If so, please add to page 10, line 205.

Page 14 „local chemical reactions play an important role in the diurnal O3 behavior. «

Page 18 line 368: Could you summarize the conclusion of the paragraph here. Does this discussion allow first conclusion on the importance of snow?

Page 24: Taken that the chemistry in snow was so nicely detailed in the manuscript, I suggest to elaborate ton this a little more in the conclusion as well.