

## ***Interactive comment on “Detection in the summer polar stratosphere of air plume pollution from East Asia and North America by balloon-borne in situ CO measurements” by G. Krysztofiak et al.***

**Anonymous Referee #1**

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The paper by Krysztofiak et al. describes balloon-borne in situ measurements of CO in the Arctic lower stratosphere during summer 2009. During a flight on July 7 significant CO pollution was observed in the tropopause region and the lower stratosphere with enhancements of the order of 50% relative to the Arctic background stratosphere, probed during a follow-up flight several days later. The authors use additional observations from other balloon soundings and satellite data to show that the CO enhancement is caused by advection of polluted air from the mid-latitudes. The origin of the air is determined with the help of back-trajectories. Also with the help of satellite data and model simulations the potential sources (biomass burning vs. anthropogenic pollution) are identified and roughly quantified. The dataset itself is unique and of high quality,

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its interpretation is sound and the paper itself well written. Overall this is a very nice manuscript that deserves publication in ACP.

The only criticism that I have is with respect to chapter 4.2.1. The authors use NH<sub>3</sub> satellite observations to investigate the influence of biomass burning on the pollution plume L1. Although they nicely illustrate the co-location of fire spots with CO and NH<sub>3</sub> enhanced columns, the chapter remains rather inconclusive with respect to the actual contribution of BB on L1. I would find it very helpful, if the authors add trajectory positions (similar to those used in Fig 6) in their Fig 7. I did this myself, and it seems that the trajectories passed over the fires in North America around July 1, while the fires in Asia did not influence the probed air mass at all.

Technical correction: On page 15515, line 11 it should read: . . . of L1(11.5 km) and L2 (13.5 km). . .

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