

Interactive comment on “Vertical ozone measurements in the troposphere over the Eastern Mediterranean and comparison with Central Europe” by P. D. Kalabokas et al.

Anonymous Referee #2

Received and published: 5 March 2007

SUMMARY AND ASSESSMENT:

The paper presents ozone measurements from the MOZAIC project for flights connecting Central Europe and the Eastern Mediterranean during the summer months of 1996 - 2002. They were used to analyse and investigate the high rural ozone levels in the lower troposphere over the Mediterranean region.

The paper is reasonably structured. However, some important arguments and critical points are lacking in the results and discussion session. In its current state, the paper is only acceptable for publication in ACP, if the authors revise their manuscript according to the suggestions and comments outlined below.

GENERAL COMMENTS AND SUGGESTIONS:

I miss a critical review of the representativeness of the selected years and profiles. The period 1996 - 2002 contains years with considerable biomass burning activity in the northern hemisphere especially during the summer months. For instance, in August 1998 large forest fires in Canada polluted Europe over a period of about 2 weeks, and in August 2002 large fires burned in the Ukraine, along the west coast of the Black Sea (Bulgaria), and even in Northern Greece, exactly where the Etesian winds are advecting air masses to the Eastern Mediterranean.

Forest fires should be discussed in relation to anthropogenic emissions. How are the emissions distributed? Right now, fires are not even mentioned with one word.

In addition, it is not clear to me, why the transport simulations were done only for 9 profiles over Rhodes during 2002, and why only one of the available CO profiles is evaluated. The conclusions drawn by the authors would be much more reliable and statistically representative, if the simulations were done and evaluated for all sites (including the Central European ones) and for all available years. From my point of view, only figure 1 and tables 1 - 3 are statistically relevant. The 2002 profiles over Rhodes might be influenced by fires, and the presented CO profile with 260ppb (!) near the surface is exceptional and should be investigated in more detail. Are the measurements dominated by local influence or is it really long-range transport of pollutants (maybe from fires)?

SPECIFIC COMMENTS AND SUGGESTIONS:

- page 2252, line 9: Please explain in one or two sentences the MOZAIC project. Not everybody might be familiar with the MOZAIC measurements.
- page 2253, lines 11: Why did the authors perform a sensitivity study excluding Antalya?
- page 2254, line 28: The anticyclone is clearly over Eastern Europe and not over

Central Europe in Fig. 3b.

– section 2.2: I do not totally agree with the discussion of the weather maps. In the group of the 25% highest ozone cases (Fig. 2a and 3a) Central Europe and especially the sites Frankfurt and Vienna are not directly influenced by the high pressure system over Eastern Europe. As far as I can see from the maps, a front has just passed Germany and Austria, and this area is therefore influenced by descending air masses behind the front.

– page 2255, beginning of section 2.3.: Figure 4 is not referenced and discussed in the text.

– page 2255, lines 20 ff: As outlined above it is not clear to me, why Rhodes and the summer 2002 were chosen. All sites and all years should be used. Due to fire activity the 2002 Rhodes cases might not be representative. In addition, it would be interesting to see the differences to Heraklion and Antalya.

– page 2255, lines 28 ff: Please provide more details on the FLEXPART simulations. How many particles were calculated from each vertical point? Did your simulation include convection? How did you derive the percentage contributions presented in figures 5 and 6?

– page 2256, figures 5 and 6: I am still not happy with the scale. Try a logarithmic one. Make clear that the figures 5 and 6 show percentage contributions PER GRID BOX. At what resolution did you output the percentage contributions per grid box? Also make clear that the values in tables 4 and 5 are the sum over all percentage contributions per grid box in figures 5 and 6.

– page 2256, line 3: Please provide the horizontal, vertical and temporal resolution of the ECMWF data you used.

– page 2256, line 28: CO is not only a tracer for anthropogenic pollution, but also for forest fires. As outlined above, please discuss the possible influence of fires in relation

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to anthropogenic pollution.

– page 2257, lines 4ff: Are the CO profiles taken on the same days as the backward simulations?

– page 2257, line 15: I do not see a similarity between the CO profile in fig. 7a and the profiles in fig. 8. The surface values of the CO profile are extremely high. This indicates either local influence or significant long-range transport of pollutants. Was this fire influence? Please investigate this in more detail? Was this the only profile with such extreme values?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2249, 2007.

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