

Interactive comment on “Evidence of tropospheric layering: interleaved stratospheric and planetary boundary layer intrusions” by J. Brioude et al.

Anonymous Referee #1

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General — This paper identifies an atmospheric profile made using a MOZAIC program aircraft which contains two airmasses which have a significant component of stratospheric air and two airmasses which have a significant marine boundary layer component. The authors identify this as a test case for atmospheric chemistry modeling.

My major concern with this paper is that it doesn't offer anything conceptually new. Examples of tropospheric profiles with air masses of differing origins have been in the literature many times in the past and I am not convinced that 'another' example of a stratospheric intrusion in the troposphere is needed. As the authors state this particular profile has already been discussed in the Nedelec [2003] paper. Thus this case in itself brings nothing new to the literature.

The Lagrangian analysis performed on this intrusion is again not in itself novel. This form of analysis has been performed extensively by Andrea Stohl, Co-worker and other groups. Although I don't think it has been applied to this particular example, the conclusions drawn from this example are no different from those conclusions drawn from other examples using this technique.

The question is therefore raised as to the scientific value of this paper.

The last paragraph of the conclusions sections suggests that a systematic analysis of all the MOZAIC data will be conducted in this way and thus this paper basically acts as a scoping study for this future wider and more interesting paper. I would suggest therefore that this paper is motivated in that way - as a scoping study for this future work. I'm not sure that we need another example of a stratospheric intrusion in the literature - enough exist. However, a systematic Lagrangian analysis of the MOZAIC dataset would I think provide a unique insight into the processes controlling the concentration of O₃ in the troposphere and this paper could be reformulated to describe the methods for this study.

If this paper can be re-written in this way I am will be probably happy for it to be published with the corrections suggested below. Otherwise I am not minded to have another paper describing another example of a stratospheric intrusion in the troposphere.

Specific issues ————— Why are the NO_y observations not used for the analysis? Was it not the NO_y equipped aircraft that made these observations? If this is the case it should be stated.

The graphs are often missing axis labels. This is unacceptable. The graphs are often hard to read and interpret. The authors should spend some time simplifying graphs so that they are easier to read and understand. Figure 3 is especially difficult. I'm not convinced that the 3 plots need to be in one figure.

The description of the lagrangian model products is very confused. This should be

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worked on to make it clearer and more explicit as to when the forwards and backwards approaches are used.

There is a discrepancy in the capitalization of lagrangian. I'm not too much of a stickler to insist upon capitalization but there should be consistency within the paper.

The authors use the term 'residence time' frequently within the paper. This has a specific scientific meaning but I don't think that is what is being used here. The authors should define what they mean by 'residence time' - I think they mean the time since the feature was formed in the atmosphere but they should be more specific in this regard.

The authors use the word 'particles' when referring the movement of airmasses. This is confusing the atmosphere contains particles in the form of aerosols, the Lagrangian model uses the concept of particles in the transport of air and then the authors use it to mean 'air mass.' The authors should attempt not to refer to particles unless they are referring to the Lagrangian calculations rather than the general transport of airmasses.

In general the quality of the English leads to some confusion as to what the authors are trying to say exactly. The description of the Lagrangian model products and results is very confusing. These sections would benefit from an improvement in the quality of the English.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 1119, 2007.

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