We thank the reviewer for his/her constructive review. For convenience reasons, we add the original comment of the reviewer in bold font.

Synopsis and major points

The paper presents a series of LES computing the dispersion of aircraft emissions during the vortex phase submitted to various atmospheric conditions (stratification, turbulence?). However only dynamical effects (i.e. without microphysical-chemical transformations) are studied and some characteristics of the aircraft plumes such as tracer dilution and plume area, are presented as function of ambient and aircraft (i.e. the circulation) parameters. The simulations confirm in general some observations of experiments and previous simulations by others. As such the results are not completely new but provide some interesting physical interpretation of the dilution of aircraft emissions in an aircraft wake evolving in a complex medium as the atmosphere. Furthermore the determination of plume dimension as well as the dilution rate will be probably useful to initialize the large-scale modelling (CTM) used by atmospheric scientists. However, I have some comments and some points need to be clarified about the methodology followed and the nature of the results.

Details comments:
Abstract: I am not satisfied by the first sentence "dispersion ... for the first time using 3D during the vortex phase...". Far as I know, a number of studies have already been performed using 3D LES calculations during the jet/vortex interaction and vortex phase. Please delete "for the first time".

The phrase "for the first time" refers to the combination of a 3D-approach and the usage of Lagrangian particles. To avoid any misunderstandings we delete the phrase (see also comment 2 of reviewer 1).

At the end of the first page, note that alternative computational strategies have been developed based on the offline coupling between a detailed chemistry model and a 3D-CFD solver (see for example Garnier et al., 1997, Atmos. Environ.).

We added the reference to Garnier et al. (1997) in the introductory section.

In section 2.1: Please specify the numerical scheme used to solve equations (1a to d).

We actually outline the solution procedure. Observing that the prognostic equations 1a to 1d can be subsumed in the generic form given in eq. 2, the subsequent paragraphs explain how the integration is conducted. A detailed explanation of the underlying MPDATA advection scheme and the preconditioned iterative GCR(k) solver for the elliptic pressure equation is beyond the scope of the paper. These aspects of the model are already well documented in the literature and we provide the associated references.

In section 2.3: In the introduction the authors stated that "...the vortex break up is crucial to know" and however this study is limited to the vortex phase "until the coherent vortex structures disappeared". Indeed, since this work is limited to the vortex regime, I wonder if the grid resolution is adequate, namely in the vortex core, when dealing with the break-up process. Could you check the number of grid points in the vortex core? This seems to be a quite coarse grid, even for LES, as many points are out of the vortex core itself (only 1 or 2 points per vortex core radius?). It is an important parameter to take into account correctly during the link (and break-up) process. Please

clarify.

We start with an core radius $r_c = 3$m. So, the vortex core is resolved by 6 to 7 grid points along the coordinate axes. The ratio of core radius to mesh size used here is similar to many previous studies like Lewellen and Lewellen (2001); Huebsch and Lewellen (2006); Paugam et al. (2010); Hennemann and Holzäpfel (2011); Naiman et al. (2011); Misaka et al. (2012).
We investigated the impact of the initial vortex core radius r_c. The initial value and the evolution of Γ_{5-15} (an often used quantity to measure the vortex strength, see Holzäpfel, 2003) depends on r_c. However, the tracer distribution is not affected at all by this variation. We further note, that the evolution of Γ_{5-15} is more realistic with NTMIX than in EULAG due its usage of higher order schemes (we did not discuss this in the manuscript as we wanted to focus on the tracer dilution). This difference is primarily due to an initial increase of r_c in EULAG (driven by numerical diffusion). However, again the impact on the tracer distribution is weak as the comparison in Figure 15 shows.
We added a paragraph about the r_c-sensitivity test in section 3.6 "Numerical issues".

In section 3.5: The authors discuss the influence of initial spatial distribution of the tracer on the final passive tracer dilution. Firstly could you explain more precisely Rinit, namely in Fig 11? Please, add a legend. Furthermore, I understand that the authors conclude that the initial distribution has not a strong influence on the final result, in terms of passive scalars whose physical interpretation is somewhat limited as the microphysical and chemical processes are not taken into account. As an example, some works have shown that the initial distribution of soot particles in the engine jet has a non-negligible impact on the distribution and the size of ice particles when microphysics models are involved in the simulations.

R_{init} is explained in section 2.3 "simulation setup". We added a sentence to the caption of Figure 11 to make the illustration more self-consistent. P30066, l16 already cites two studies relying on 3D LES, which investigated the sensitivity to the initial spatial distribution during the vortex phase and found similar results.

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