We thank Referee 1 for his/her comments and useful remarks. In the following we include our answers point-by-point.

1) *The title is rather generic and does not fully do justice to the contents: It should reflect both the fitting of an equilibrium tangential discontinuity solution to the MMS data and the study of the time-dependent evolution of the structure*

Our choice intentionally put the accent on the question of "how building a realistic multi-model of the magnetopause" rather than on the study of the magnetopause stability (and the consequent mixing issues) resulting from a specific initialization. In our mind, this is the real point we want to address. The stability study, as outlined in the text, is more an example or a case study of our main aim . A possible alternative for the title could be "Building a realistic model of the magnetopause for initiating a numerical simulation", even if we would prefer to maintain our first one.

2) *...So how does the assumption of a single electron population limit the applicability of the model to the magnetopause situation? The authors should discuss this issue in some depth, for instance at lines 35-38, where they argue for a three-fluid model. The question that should be answered is: why not a four-fluid model (magnetosheath and magnetospheric electrons + magnetosheath and magnetospheric ions)*?

This remark is pertinent and it was a serious oversight not to have mentioned it in the text. Our final goal is indeed to build up a four-population model capable of distinguishing the magnetosheath and magnetospheric electron populations. The present paper must be considered as a first step in this direction. The main reason for starting with only one electron population was to avoid, as a first step, to enter into too many details for these species that are not likely to have a major role in the equilibrium. Actually, to model correctly the electrons in the magnetopause vicinity, it would be not sufficient to distinguish between one single magnetosheath population and one single magnetospheric one. In particular one should split the magnetospheric electron population itself into at least two sub-populations: one "cold" (poorly measured), carrying the density, and one "hot" carrying the pressure. Last but not least, we must say that starting from a previous already existing two-fluid code, it has been not so difficult to build up a code with several ion populations under the same quasi-neutral hypothesis, the electrons just providing an "Ohm's law". On the contrary, building up a fully multi-population model with several electron populations requires a radically different algorithm. We have actually developed this new algorithm, but it still remains to be implemented and tested. All these explanations will be added in the revised version.

3) *Regarding existing magnetopause models, the authors paint an overly pessimistic portrait. Some magnetopause models, ….*

In our paper we have included a paragraph introducing the general context and briefly summarizing the state of the art of the most relevant models available in the literature. Nevertheless, this paragraph is relatively short being not the central topic of the paper. We admit that our summary was too short, in particular when addressing the kinetic models. For these reasons, in the revised version we will modify this paragraph in order to avoid all possible ambiguous claims that could lead to any misunderstanding about this point. Keeping our willingness to be short, and without suppressing completely this part about kinetic equilibria, we now cite *Whipple et al* about the "accessibility problem", which is related to the confinement of the particles within their Larmor radius. We now also distinguish between models based on the invariant conservation only (Channel: one single function of the invariants assumed valid everywhere for f(v)), those partly introducing the accessibility problem (Roth et al: two different functions for the two sides), and those introducing it more completely (Belmont et al, Dorville et al). The last ones make the natural transition between the kinetic and MHD equilibria, the thickness of the magnetopause being not imposed a priori to be equal to the thermal Larmor radius (in MHD, the accessibility problem is extreme since each particle is confined within an infinitely small Larmor radius). However, we would like to maintain our point that the normal electric field, as shown in Belmont and Dorville, is not in general determined in the kinetic models of tangential layers. Let us recall for instance that it is assumed null in the most classical one: the Harris model. In other words, the normal electric field can be a byproduct of the model, but it is then a consequence of the simplifying assumptions of the model itself and not imposed by the Vlasov-Maxwell system of equations.

4) "The use of the model to study the time evolution of the observed structure poses a few questions that should be clarified..."

We agree with the referee's remark that it may appear contradictory to consider the data as characteristic of some magnetopause equilibrium and observe afterward that this equilibrium is not stable and should not last for long (even if the reconnection phenomenon is not "immediate"). To justify this point, we argue that the main characteristics which are taken into account are the asymptotic values on each side and the velocity shear between magnetosheath and magnetosphere. These conditions are not changed by the instability. The positions and the scale of the different gradients can indeed be partly modified by the instability, but we think that this is one of the interesting issues that can be investigated by the time evolution observed in the simulation. How the system stability is impacted? (need of a parametric study); how does it change in time due to non linear effects?; will the simulation tend toward a new more stable equilibrium state? This is left for further work. We will try to make it clearer in the text paper.

5) Minor issues. We thank the referee for his careful reading. We will fix all these points in the final version following your suggestions.