Anonymous Referee #2

We would like to thank you sincerely for your precious support to correct the text, and all your suggestions. Before answering to your questions, we must confess that there was an error in the coding of the deposition process : the deposition velocity was mistakenly multiplied by the volume of the grid, corresponding to a ratio of 25 for all the simulations at 5m resolution (so a deposition velocity of 50 cm/s instead of 2 cm/s was actually applied), and to a ratio of 4 for the simulation at 2m resolution (noted DX2). Consequently, the deposition effect was overestimated.
All the simulations except the one without deposition (called NDG) have been run again and most of the figures have been updated. For the REF simulation (with a deposition velocity of 2 cm/s), the discrepancies with the observed microphysical fields are a bit stronger (cloud mixing ratio and droplet concentration more overestimated), but the DE8 simulation (deposition velocity of 8 cm/s as it was requested by one of the reviewers) presents a significant improvement. The signature of the fog onset at elevated levels in the REF simulation is not so marked, and is more evident in the DE8 simulation, showing that both the tree drag effect and the deposition are necessary to reproduce the formation of fog at elevated levels. The new results do not modify the analysis of the fog event and the conclusions of the study.
The text has been also reduced to answer to the reviewers : the sensitivity test on the initial conditions has been removed, as well as the corresponding figures. The length of the text has been reduced as expected. Lastly, the text has been revised by an english native speaker.

Recommendation: Major revisions required.

Overview: This manuscript presents an original and thorough examination of a fog event at a site with varying land use (grass and trees). The authors have used LES simulations to assess the impact of a line of trees on the formation and lifecycle of the fog. A variety of different simulations were used to determine which processes were having the largest effects on the fog, and this has resulted in improved understanding of this scenario, as well as some recommendations for improvements in further fog simulations.

The presentation of the manuscript could be significantly improved by being proofread by a fluent or native English speaker. There are many spelling and grammatical errors in the manuscript, as well as a considerable number of instances of awkward phrasing. The formatting of the manuscript is also inconsistent. These problems make the manuscript very hard work to read, and obscures the nuance and scientific value of the authors work, which is otherwise good.

The text has been revised by a native speaker of English.

Scientific comments:

1. *P3, line 33: What sort of profiler are you using?*
   This is a RPG-HATPRO water vapour and oxygen multi-channel microwave profiler : this information has been added.

2. *P4, line 17: How do you differentiate between radiation fog forming under very low (150m) cloud, and cloud lowering to the surface? You describe this event as follows: "the cloud base height progressively subsided during about 30 min, until it reached the ground". This sounds indistinguishable from stratus fog.*
   You are right that the distinction between radiative fog and cloud lowering is not easy to make. Fog classifications traditionally use the Tardif and Rasmussen (2007) method. They differentiate stratus lowering from radiative fog by the wind speed and the cloud ceiling. If the wind speed at 10m is lower than 2.5 cm/s before the formation and the cloud ceiling is less than 100m then the fog is supposed to be radiative. Our measured wind speed at 10m is

under 2.5cm/s but our cloud ceiling is higher than 100m (150m). However according to Dupont et al. (2012), the lowering of a stratus is due to a cooling at its base by evaporation of sedimented droplets. Considering fall speed of 2.2 cm/s (Roach et al, 1976) it would necessitate at less 10 hours for the cloud to reach the ground. Moreover we believe that the cloud formation at 150m is due to the modification of the flow caused by the tree barrier resulting in an important vertical mixing on a significant depth. So we conclude that this fog is a radiative one.

We propose the text :

« As underlined by Stolaki et al. (2015), this characteristic is very common at Sirta and 88% of the radiation fog events during the field experiment were also elevated. However, they were not classified as stratus lowering as they were followed rapidly by formation of fog at the surface. A delay of 30 min between the formation at 150 m height and at the ground seems too short to be a stratus lowering, which is mainly driven by the evaporation of slowly falling droplets that cool the sub-cloud layer (Dupont et al., 2012). This suggests that this type of radiation fog could be linked with, and specific to, the configuration of the Sirta site. »

3. *P4, lines 24 & 25: It is not clear to which TKE measurement you are referring here. The increase in TKE at 10 m occurs 30 minutes before the increase at 30 m, not simultaneously. After this increase there is still quite a lot of variability in the TKE, so I would not describe it as constant.*

   Yes, we agree. This has been corrected by :

   « Around 0400 UTC, the TKE at 10 m height increased significantly, by 0.5 m^2/s^2, and then presented some variability around this value, while maintaining a positive vertical gradient .»

4. *P5, lines 1 & 2: There is a 30 minute difference in timing between the increase in LWC and Nc.*

   This 30 min difference was due to the minimum value of Nc used for the plot. In the revised paper, LWC has been replaced by the cloud mixing ratio, and the minimum values of rc and Nc plots have been reduced : there is no time lag anymore.

5. *P9, line 13: More detail about the temperature convergence is required – i.e. The temperatures measured at different heights converge.*

   Yes, this has been corrected by : « At 0230 UTC, the apparition of fog at the ground was associated with a temperature homogenization in the first 30 metres, called temperature convergence by Price (2011) and corresponding to a neutral layer. »

6. *P9, line 14: If only RH is being considered, it is not accurate to say that fog formed at 0230, only that saturation was reached. You need to refer to e.g. a visibility measurement.*

   Yes, we agree. A reference to the microphysical fields has been added.

7. *P9, line 22: This increase in TKE occurs > 30 minutes before the TKE increase in the observations.*

   Yes, you are right, this advance of 30 min corresponds to the advance of 30 min on the formation of fog near the ground : the remark has been added : « Around 0300 UTC, a more sudden increase of TKE occurs, as in the observations but 30 min before and with a lower magnitude. »

8. *P10, line 25: Please define the difference between sedimentation and deposition.*

   Sedimentation corresponds to the gravitational settlement of droplets (it has been added in 2.3.1), while deposition represents direct droplet interception by the plant canopies (already defined in 2.3.1).

9. *P11, line 9 and onwards: You keep switching between LWC and rc throughout the manuscript. It would be better to consistently use one or the other.*
   Yes, we agree. Only cloud mixing ratio is now used throughout the paper.

10. *There are a few statements throughout the manuscript which are accompanied by "not shown". Is there a particular reason why they are mentioned, but not included in plots?*
   No there is no particular reason, but only to limit the number of figures. The number of « not shown » has been reduced.

11. *P15, line 6: What do you mean by the "production" of Nc?*
   « Production » of Nc corresponds to the positive temporal evolution of Nc, considering the prognostic evolution of this field. Production terms of Nc come from activation, accretion, autoconversion, evaporation and sedimentation as presented in Khairoutdinov and Kogan (2000) and Geoffroy et al. (2008). A mention has been added as : « Inside the fog layer, despite the increase of r_c , the positive temporal evolution of N_c, called the production of N_c is not higher than in REF »

12. *P16, line 5: In the context of fog microphysics, 3m is not especially "near surface".*
   Yes, this has been corrected.

Technical comments:
1. Section 2.3.1: Not all terms of the equations presented in this section are defined in the text.
Thank you, definition of S and ρ_a have been added.

2. Section 2.2.3: The figure numbers in this section do not correspond to any of the figure captions.
We suppose you speak of Section 2.3.3 and figure A.2 is given in the Appendix on Material support.

3. P9, lines 17-19: It is difficult to see the negative temperature gradients in Fig. 2, due to the number of lines.
The number of lines has been reduced with only 1m, 5m and 30m.

4. P9, lines 20 & 22: Please refer to Fig. 3a & 3b, instead of just Fig. 3.
OK.

5. P11, lines 15-17: It would be helpful to the reader if the different phases of the fog lifecycle were marked on any plots showing a time series of data.
OK, the 3 phases have been plotted on the (z,t) plots.

6. P11, line 30: "when the fog reached approximately 80 m". Is this the depth of the fog, the height of the fog top, or the location of the cloud/fog base?
Yes, this is the depth of the fog and also the height of the fog top. It has been corrected.

7. P11, line 33: Fig. 7d shows updraft velocity, not cooling.
Yes, thank you.

8. Section 3.3: Marking the location of the trees on plots of spatially varying data would make the figures easier to interpret.
OK, this has been added on Fig.9 and 12.

9. Please put the figures in the order in which they are first referred to in the text.
This has been corrected.

10. There are numerous occasions where the figures are incorrectly referenced in the text. Please correct this.
This has been corrected.

11. When plotting a time series from the LES, please state where in the domain the data was from.
This has been added.

12. P18, line 12: Are you referring here to the surface, or 3m?
You are right, it is 3m.

13. References: The capitalisation of journal titles and place names in the reference list is inconsistent, there are also some references missing page numbers.
Yes, it was a problem of Latex and it has been corrected.