The article presents a description of SURFEX and describes the key features and it definitely merits publication in this journal. Please see my specific comments and suggestions below:

> We thank referee #1 for the comments that will help to improve the manuscript. The answer to the specific points are detailed below.

1. The article could be improved by providing a "big picture" vision behind SURFEX. It definitely has a lot of bells and whistles. The vision of SURFEX is to be a hydrometeorological platform or more of a global modeling platform or both? Is it supposed to cut across both NWP research and applications? Some of these are scattered throughout the document. It would help to describe them right at the top before getting into the nitty gritty of the models.

> The introduction and Section 2. will be completed in order to give an overview of the applications of the models, and technical elements. Section 2. will be completed by a technical scheme that will give an overview of the model

2. It would also help to provide a review of similar efforts at other organizations. There are land data assimilation systems (LDAS), Land Information System (LIS) from NASA, High Resolution LDAS from National Center for Atmospheric Research, efforts at Environment Canada, etc. There has been a lot of work done with GLDAS, NLDAS efforts. Weather Research and Forecasting (WRF) model is another relevant effort to compare (depending on how the authors view SURFEX).

> The introduction will be completed by a reference to the current efforts for the building of LDAS (with reference to LIS, NLDAS, GLDAS).

3. I suggest that a schematic figure describing the SURFEX structure and its key pieces be included (ISBA, TEB, DA, hydrology, dust etc.). The authors do not have any mention of the software architecture behind it and if any thought has been put into designing the system. Does SURFEX include any notion of interoperability and extensibility? How easy is to include various components?

> A schematic figure of SURFEX will be included and will support Section 2. The question of interoperability, extensibility will be treated in Section 2. The modular structure of SURFEX allows easy inclusion of new parameterizations, provided they fit in the modular structure (e.g. PGD, PREP, RUN, diagnostics must be separated and introduced in the relevant parts of SURFEX.

4. SURFEX seems like a big, complex system, especially with the addition of data assimilation and coupling interfaces. Can the authors provide some estimates of the computational requirements and how they are addressed in SURFEX?

> The computer requirements depends on the use, it is difficult to give a simple answer to this question. The memory and cpu time needed depends on the application. SURFEX can be

run on a PC for simple applications (few grid points, short simulations), either in monoprocessor or multiprocessor mode. But for the largest applications (numerical weather prediction, or long climate runs) supercomputers are needed. A mention of these possibilities will be included in Section 2.

5. The abstract could be improved. The sentence "It can be run in either coupled or offline mode" is repeated. Rather than describe an outline of the paper (which is how the abstract now sounds like), it should describe what SURFEX is and its key capabilities and its vision.

OK, the motivation for the building of SURFEX will be introduced in the abstract

6. NOAH is not an acronym. It should be written as "Noah"

Will be corrected

7. Section 2: "SURFEX uses the widespread tiles approach" – I would avoid such descriptions. Please be specific and provide the correct reference.

A correct citation is provide now, this part will be improved in relation with a comment from reviewer 2.

8. Section 3: Is SURFEX limited to a particular set of datasets? How flexible is it to plug another dataset?

It is easy to use other datasets than those described in the paper. Indeed some other databases that cited in the manuscript are used today. The only limitation is that the data must be provided in a format that can be read by SURFEX. Another limitation is that a lot of informations for plant functional types are provided in ECOCLIMAP, so the entire replacement of ECOCLIMAP will require a lot of efforts.

9. Section 4.1 "...while minimizing the input parameters and optimizing the speed.." – is it supposed to say "optimizing the input parameters and minimizing the speed.." ?

Yes, will be corrected

10. Section 4.1.1 " .. the usual aerodynamic .." - please be specific.

The correct reference to Louis (1979) and Mascart (1995) will be added.

11. The description of the ISBA/TEB modules and parameterizations are quite extensive. Since most of this stuff has already been published, the authors could condence these sections to be more succint.

We agree that this part of the paper is long, but it reflect the recent scientific activities on these codes. Actually, the TEB description is quite short. The ISBA description is longer, but citing a long list of references will not allow the reader to easily construct is own point of view on the numerous scientific options of ISBA. The last review paper of ISBA was published in 1996 (Noilhan and Mahfouf, 17 year ago), and we consider that a comprehensive description of ISBA is worth publishing.

12. Section 7.2 : There is a mention of CDF matching for bias correction in the context of ASCAT assimilation. The issue of addressing biases is in fact a larger data assimilation problem and it would be helpful to address it in this section.

We agree that the assimilation of biased data is an issue. Actually, SURFEX assimilates

only with unbiased data. The correction of biases must be done as a pre-treatment of the data. As it is outside SURFEX, we wont go into details for the bias correction in this section. However, the text will be corrected in order to avoid any misinterpretation.

13.The perspectives section could describe what are some of the limitations of the system.

The most important limitation of the present system is related to technical issues (e.g. there are still some problems to handle global grid at high resolution) and the lumped energy budget of ISBA. The latter point was already mentioned in the perspective section, while the former will be added.

14.Figure 5: Can you quantify the information in these two maps (average skill for e.g.), either in text or in the figure itself?

The quantitative information will be introduced into the corresponding text of section 8.1.1.

15.Figure 7: It is pretty obvious, but which figure corresponds to what?

The figure legend will be completed

16.Figure 8: Are the improvements shown in the curves statistically significant?

As said in the legend, (A green star indicates that the score difference is significant with a 90% confidence level) some improvement are significative (mainly for low precipitation, but also for some higher threshold, e.g. 20 mm for the Frequency bias).