The authors would like to sincerely thank the reviewers for taking the time and effort to help us improve the manuscript and for pointing out what parts of the manuscript needed improvements. We appreciate your valuable comments and suggestions and, according to your comments, we have made the changes outlined below. We have separated major and minor comments and the reviewer comments are indicated in blue.

Major comments

You need to explain what the Parker spiral is, that it concerns the orientation of the magnetic field.

Line 126-128: We have added “the interplanetary magnetic field (IMF) follows the Parker spiral orientation, a spiral shape that the Sun's magnetic field takes on as it expands throughout the Solar System”.

Are there no measurements of the magnetic field available from JUICE, not even preliminary, to compare to the models?

Table 1 and 2. We added magnetic field values obtained from J-MAG on JUICE to the tables. These parameters have also been described in lines 148 - 149 and 213 - 216. We then used these values to re-run the simulations and have updated Figures 7, 8, 9 and 10 with the new simulation results. The measured magnetic field values from J-MAG are in good agreement with the modelled values. Therefore the J-MAG results had an insignificant impact on the results. We also changed the definition of the velocity parameters and the SPIS parameter called the BFieldIterativePusher for the magnetosheath simulations. Changing these two parameters had a minor impact on the final results. The velocity parameters were changed to the drifting velocity in the spacecraft frame by updating on the spacecraft velocity parameters and leaving the plasma velocity parameters to 0. This ensures the values are treated correctly in SPIS when a magnetic field is added, whereas previously the values were defined by specifying both the plasma and spacecraft velocities separately. The BFieldIterativePusher value was changed to 1 to use the newer particle pusher method in the case of a magnetic field. Changing these two parameters changed the average surface potential from 2.5 V to 2.7 V. These values are updated in lines 8, 224 and 344. Figures 7 and 8 were also updated to correspond to those from the new simulation.

Make clear here or later that the data used is historical, in the current text the reader may be confused to believe that data was obtained for the particular occasion of the JUICE LEGA.

This when I first read it gave me the impression that data was obtained for this particular event, except that I knew that at least some of the spacecraft are since long not operational. Maybe better to start out noting that not much data is available from the plasmasphere and that you rely on a few historical data sets to find suitable values.

Here again, make clear this is historical data.

Line 167. Have added the word “historical” to describe the data.

Line 181 - 182. Have added the introductory sentence “During closest approach, no nearby spacecraft were available to obtain plasmasphere parameters from at this time, resulting in the use of historical and model data instead.”

Line 191. Have added the phrase "historical studies”.

Knowing the significant impact this had on Rosetta (and knowing F.L. Johansson is a co-author of this paper) why is the result for JUICE so different from that of Rosetta? Densities are reasonably similar, warm electron temperature lower and magnetic field much higher in the plasmasphere compared to 67P. Could this explain the difference?

A detailed study of the difference between the impact of the interconnects on the surface charging of Rosetta and JUICE (in the plasmasphere) is beyond the scope of this article. That said, we can conclude that several important factors differ between the two studies (comparing the results here with the results from Johansson, F. L. et al. (2020)):

1. The environment at Rosetta has a smaller warm and cold electron density by around 1 order of magnitude, and the magnetic field values were much greater in the plasmasphere.
2. The methods used in the two papers are very different, with our paper using the newer implementation of interconnects in SPIS whilst a simpler interconnect modelling approximation is used in the Rosetta study.

To clarify this we have added the following sentence: Line 329 - 334. “The results obtained here differ from those on the Rosetta spacecraft in part due to the difference in the environment and design between the two spacecraft which are not directly comparable. Additionally, another important factor is the difference in the simulation methods used in Johansson et al. (2020) and this paper. Previously there was no built-in method included in SPIS to simulate interconnects, so users would have to build and include small interconnects on their 3D spacecraft model. When using the method to build and include small interconnects, simplifications could be made that have an overall impact on the simulation results.

Additionally to verify our simulation we compared the difference between the results for a small rectangular panel using a PIC and hybrid simulation method. The difference between the two was found to be small, so the hybrid method used in these simulations should not significantly affect the results or conclusions.

Minor Comments

On line 27. We removed: “here” and “here”, respectively.

Line 31. Replaced “on” with “of”.

Line 227. We removed reference to instrument.

In addition to the comments from the reviewers we have made the following changes:

Added 2 coauthors Patrick Brown and Michele Dougherty due to the use of J-MAG data in the analysis.

Line 9. Added word local.

Line 128. Replaced “dawn dusk” with “dawn-dusk”.

Figure 4. Has been updated to include the positions of the PEP/JEI and PEP/JDC instruments.

Figure 6. We have changed the figure to improve the resolution, and the colours were changed for readability and to be colourblind friendly.

Figures 9 and 10. These were updated to reflect the changes in the simulation which corrected the treatment of velocities as for the magnetosheath. There was no significant change observed in the results of the average surface potential of the spacecraft with the main change seen being a slight difference in the background ion density.

An appendix was added to further detail the photoelectron motion observed in the plasmasphere.

Figure 12. Updated the figure using an updated version of SPIS which corrects for the treatment of photoelectrons in the interconnect simulations. This was found to have no significant impact on the overall results.

Line 184 - 232. Restructured description of electron parameters used in simulations for improved clarity.

Line 239. Added the word “obtain”.

Line 274. Added phrase “and move under the influence of local fields,” for clarity.

Line 333. Changed the word “Panel” to “Figure”.

Line 364. Changed result of spacecraft potential at earlier time in magnetosheath from 3.5 V to 3.4 V using the updated SPIS parameters as described previously for the main results in the magnetosheath.

Line 376. Added the sentence “through simulation results using the built-in implementation of interconnects in SPIS” for clarity.