

## Comments

### Referee #2

Dear authors, thank you for this nice paper describing the JUICE LEGA very clearly. The figures support the paper very well and help explaining the content of the paper. Overall, I do have some minor comments. The title and abstract of the paper describe and summarize the paper well and allow for a good overview of the paper. The text is mostly written in a clear and structured manner and mostly easy to understand. It clearly shows the novelty of the LEGA and the gain for the mission, but it is hard to see where the authors directly contributed to the work. As a general remark please consider to add a plural “s” to abbreviations when needed.

In detail, please consider the following comments:

1	Line 9: “... redirecting JUICE toward its...” should be “towards”.	AD	Fixed
2	Line 28: I suggest to replace the “-“ between “500-km” and “200-km” with a “ “.	AD	Fixed
3	Lines 19-29: Could you add some references to papers describing the JUICE mission (e.g. the special issue of JUICE describing all instruments which is hopefully published this year).	AD	Added spacecraft design, JUICE mission and ground segment references.
4	Line 38: You mentioned that the main engine is a bi-propellant engine consider adding for the attitude and orbit control thrusters that these are bi-propellant as well.	AD	Removed "bi-propellant" for simplicity.
5	Lines 50-58: Consider adding references to instrument descriptions (if not published yet maybe also reference the JUICE special issue which is hopefully published this year).	AD	References to relevant instrument publications have been painfully added.
6	Lines 59-61: Maybe consider adding RADEM here?	AD	Very good point. RADEM was added.
7	Line 72: B-plane is not introduced here as Body-plane. Maybe introduce it here already and not in line 168-170.	AB	Footnote was added
8	Lines 70-75: The paragraph in general is written a bit unclear and interrupting the flow of the text. Would it be possible to connect it better to the previous paragraph for example by explaining the “patched conic model” in more detail and with some reformulations?	AB	Reformulated
9	Line 78: “measurements” should be singular here (“measurement”).	AB	Fixed
10	Lines 86-98: The three paragraphs do not link together very well. Maybe move the paragraph lines 90-93 to another place or reformulate it to get a better connection as you did not write about the launch window so far.	AB	This comment was answered last. It led to a major reshuffle of the entire section. This outdates some of the answers to other comments
11	Lines 91-93: Reformulate this sentence and potentially split in two as the term “... close these days...” for example is not clearly stating that you mean: “remove these days from the launch window”.	AB	Reformulated. REM: "closing" the launch window is the official wording
12	Line 104: “Ariane 5 ECA” Why do you use this special version? Maybe clearly state that it was used to bring JUICE to orbit and add a reference to it? You could also already introduce it in the paragraph spanning lines 90-93.	AB	Clarified
13	Line 110: Consider replacing “specificity” by “characteristic”.	AB	Fixed
14	Lines 110-113: This paragraph feels out of place here and disturbs the text flow maybe consider linking it differently to the previous paragraph.	AB	Comment not understood - it already seems clear enough.
15	Line 114: This was already mentioned in line 94. Is it needed here?	AB	Reformulated
16	Lines 126-130: Why does this concern safety? From your first sentence in this paragraph the impression is that you will talk about safety but this is not the case here.	AB	Clarified
17	Line 134: “This difference partially compensates the deterministic Delta-V saving.” Does it really compensate for the Delta-V saving and not reduce the Delta-V saving?	AB	Fixed
18	Line 135: “The preliminary estimate...” The estimate of the compensation or the estimate of Delta-V? Please clarify.	AB	Clarified
19	Line 140: Suggested to remove the part in parenthesis.	AB	Removed
20	Lines 140-141: “... than without it (). This is...” Consider adding a paragraph before “This is...”.	AB	Done
21	Line 141: “(which is slightly different for both the LEGA and the EGA cases)” you did so far not state that an EGA case was considered at certain parts of the launch windows. This should be added earlier maybe mention this already in the paragraph lines 90-93?	AB	Fixed, sentence added in the paragraph before Figure 2
22	Lines 144-145 (Figure4): if you adjust the x-axis in figure for according to my comment bellow remove the date conversion in parenthesis.	AB	Removed
23	Lines 151-155: You mentioned safety before. Consider merging both paragraphs into one and expand more on the safety criteria. It is not clear why the safety aspect is important and has to be considered with the current formulation.	AB	Safety was mentioned before only to introduce it as a challenge. One sentence is added to clarify
24	Line 159: Do you have a reference for the LEGA inception from 2012?	AB	Yes, it is the paper of Schoenmaekers, Langevin, Boutonnet and Martens mentioned in the abstract
25	Line 164: Consider removing “by the interested readers”.	FB	Removed
26	Line 166: “... a-priori zero and...” to what is the zero referring to? Please clarify.	FB	Added Delta-Vs
27	Lines 168-170: Could be removed if the B-plane was introduced before.	FB	Shortened and reference is made to section 2
28	Lines 170- 171: “The two directions in the plane are defined as T and R whereby the former...” it is not clear if the former refers to the “T” or the plane and the R axis is not defined. Please clarify.	FB	Made more explicit.
29	Line 205: “... Figure 6...” This reference should be Figure 7.	FB	Fixed
30	Line 241: “Jupiter system” suggest to change to “Jovian system”.	FB	Done
31	Line 247: “Km” should be “km”.	AD	Fixed
32	Line 263: Consider removing “shortly”.	AD	Done
33	Line 267: “...optical head blindings and straylight happened...” consider adding “detections” (or something suitable) after “straylight”.	AD	Done

## Actionee Answer

34	Lines 269-270: "...using only internal measurement unit (IMU)" insert "the" → "...using only the internal measurement unit (IMU)".	AD	Fixed
35	Lines 285-286: Consider changing the layout here, as the "-" sign does not clearly belong to the number following. The same counts for the "+" sign.	AD	Fixed
36	Lines 293-298: Layout change from lines 285-286 should be propagated to here as well.	AD	Fixed
37	Line 299: "-" can be mistaken as a minus.	AD	Fixed
38	Line 317: remove "team" in "Flight Control team".	AD	Fixed
39	Add section "Author Contributions" before Acknowledgements.	AD	Section was added.
Figures:			
40	Figure 2: The dotted lines which intersect between the lunar orbit and the JUICE trajectory are not mentioned anywhere. Either remove them or explain their meaning by e.g. indicating that each intersection of one of these dotted lines with one of the trajectories corresponds to some specific date. Change either red or green color due to red green blindness.	AB	Fixed
41	Figure 3: Consider to add arrows to indicate the direction. Move "Moon Orbit" to the left of dashed line and use the blue color from the dashed line.	AB	Fixed
42	Figure 4: Consider to convert the x-axis into a format of either DOJ or actual calendar dates to improve readability. Additionally, consider in the image caption to change "vertical black lines" to "vertical black lines with star marks". Consider changing red or green color to something else.	AB	Fixed
43	Figure 5: Replace Figure so that selection of middle box is removed.	FB	I do not understand this comment; please clarify.
44	Figure 6: "... overlaid contour plot..." Why is the contour plot so much smaller than the actual figure? Maybe increase the size so in the contour plot it is visible that the estimated impact point and the target are within the contour. Explain legend of the right plot in the image caption more as the dates are not present in Figure 5 and STP# references are not explained at all. Move "Decision to execute TCM-4w!" to bottom left of figure to make it consistent with Figure 7.	FB	The contour plot is pre-computed, i.e. starting from the optimum target point the impact point is systematically perturbed by small Delta-Rs and Delta-Ts, and for each the full JUICE trajectory is re-optimised and the required mission Delta-v computed. This is a heavy numerical process which had been performed up to some reasonable upper limits of Delta-T and Delta-R, i.e. there is no data available beyond the contour points that are displayed. However, I do not see this as a significant disadvantage for the flow and understanding of the paper.  The caption of Figure 6 has been updated to explain the legend in more detail and to link it towards the diagram in Figure 5.  I prefer not to move "Decision to execute TCM-4w" since this plot is different to Figure 7 in the sense that it shows the same data at different zoom levels, whereas in Figure 7 two different solutions are at different epochs are shown. I consider the location as is also more suitable since it aligns with the text on the left side of the plot ("Status 16 July 2024").
45	Figure 7: The estimated impact point seems to not have moved in the left panel of the figure. Compared to Figure 6 is this correct? If so why is a 10m/s correction maneuver enough?	FB	The red impact point and error ellipse in Figure 7 are identical to the red one in Figure 6 - these are just re-drawn to give a link between both plots. The red impact point would be the result after a perfect execution of TCM-4w (and all other dynamic models are perfect as well). However, the estimated impact point for the DCO after TCM-4w is the yellow one, which has moved.
46	Figures 2-8: Improve resolution.	AB/FB	Done