We would like to thank the reviewer for his time reviewing our paper and comments, which we think will help to improve the paper. We are detailing below our response to the different comments. Additionally, changes to the package following the mentioned suggestions have been implemented in a new version of asterisk (1.4.1), which has been submitted to CRAN.

———— Review

The package and the paper are very specialized and can be of interest to the R community devoted to aerospace navigation, and in particular, to satellites. Their goal is to provide an interface for dealing with satellite positional data (reading/writing files, calculating trajectories with several methods, and performing conversions between coordinate systems). Apparently, there are no other R packages with the same aims.

The paper is in general well written, the use of the package is sufficiently explained and the references are enough and up-to-date.

However, two serious flaws weaken the work as a whole. One is the dependence of 'asteRisk' on another data package outside the CRAN ('asteRiskData'), and which is not explicitly stated in the CRAN asteRisk's dependencies. The second one is that the code examples provided fail to execute on their current state, for a number of reasons. These two issues must be solved before the paper can be considered for publication.

A revised version of the 'asteRisk' package and the paper should only include examples that do not rely on external files of another package, especially one that is not in CRAN, and all the pieces of code should be self-contained and runnable without errors.

* Article:

- In the introduction, it is stated that "utilities for reading and writing file formats commonly used to distribute satellite positions (ephemeris) are provided". However, I have not seen any function for writing data. Does such a function exist? If not, please fix the text accordingly.

We apologize for this error in the text, which has now been corrected.

- According to the data files provided with the package, it seems that both TLE and RINEX formats rely on structured plain text files. This fact should be stated in the paper and in the package documentation.

This has now been clarified in the paper and documentation. The text now reads: *"asteRisk provides functionalities to read both types of files, which consist of plain text files structured according to the definitions provided by the organizations that implemented each standard."*

- In the paper, a "TLE" file can include several/many "TLEs", which is a bit confusing. In a "TLE" file with more than one "TLE" data structures, would they be concatenated in the file? Please clarify that in the text (mainly on p. 2).

This has now been clarified. The text now reads: *"It should be noted that a TLE file can contain multiple of the described TLE data structures, which would be concatenated in the same file with no additional separator."*

- Please explain in the paper what is the PRN code for a satellite.

This is now explained. The exampled where PRN codes were mentioned now describes it as follows:

"

## We can verify that both the TLE and the RINEX file correspond to the same
## satellite by comparing the PRN codes, which is in both cases 18. A PRN code
## is an identifier unique to each satellite of the GPS constellation
"

- Avoid expressions such as "Said methods" (p. 1), "said frames" (p. 13), "said intersection", "said time" (p. 14) which make no sense in English.

These have now been removed.

* Package:

- One of the two major flaws is that 'asteRisk' requires an additional data package outside the CRAN, called 'asterRiskData'. The 'asteRisk' package, the code from the paper and the provided R demo script must be self-contained, and able to be executed without any external requirements. In particular, the 'asteRisk' package should include at least some elementary examples to show that the code runs correctly on its own.

We would like to explain more in detail the requirement for the additional data package outside of CRAN. The mentioned "asteRiskData" package is required by some (but not all) of the functionalities of the package, namely some conversions between frames of reference and the HPOP. The reason is that these operations require large amounts of data and coefficients, which are what is provided in asteRiskData (i.e., we do not provide examples in it, but required coefficients). These include, for example:

- Earth orientation parameters: these describe the exact position of the axis of rotation of Earth on a daily basis, required to convert between the GCRF and ITRF frames.
- Daily records/forecasts of space weather, solar storms and geomagnetic storms data: these are required to accurately calculate the forced induced by solar radiation pressure, as well as to calculate atmospheric density (influenced by geomagnetic storms and solar radiation), which in turn is required for calculating the drag force.

- Spherical harmonic coefficients for the gravity potential model of Earth: these are required to accurately calculate the gravity field at a given point generated by Earth
- Spherical harmonic coefficients for ocean tides: required to calculate the alteration of the Earth gravity field due to the deformation of Earth induced by oceanic tides
- Coefficients for solid Earth tides: same as for ocean tides, but in this case due to the solid Earth tides, i.e., displacements of the solid Earth's surface.
- JPL Development Ephemerides: these are very large sets of coefficients provided by NASA's Jet Propulsion Laboratory which allow to accurately calculate the position and velocity of the Sun, Moon and planets at any given time, which is required to calculate the gravitational force they exert on a satellite.

Due to the large amount of coefficients involved, these pieces of data add up to almost 100 MB. This is well beyond the maximum size of 5 MB enforced by CRAN, specified in CRAN's policy. Even if an exception was made, we would then only be allowed to very rarely update the package, since all older versions are archived by CRAN, and therefore a normal update rate would take up too much space on their side. Upon inquiry on the R-devel mailing list, we were advised that the best solution was possibly to distribute the data in a separate data-only package, which would be provided as a drat repository. Drat repositories are well-documented (https://cran.r-project.org/web/packages/drat/index.html) and employed by a considerable number of CRAN packages with similar requirements for large pieces of data. This is explained in the documentation and DESCRIPTION file of "asteRisk". The asteRiskData package cannot be placed in the Imports or Depends fields of asteRisk because it is not on CRAN. Therefore, and following solutions already implemented in other CRAN packages, we placed asteRiskData in the Suggests field, and use conditionally the data when required to fulfill CRAN check requirements.

For these reasons, and due to the restrictions on size implemented in CRAN's policy, we believe it would not be possible to provide the required coefficients directly within the main asteRisk package.

- Another serious flaw is that the demo script does not run on its own. For instance, the first example (p. 2) starts with:

(ayala2021b.R, Line 16): test_TLEs <- readTLE("./data/testTLEs.tle")

giving an execution error. The file 'testTLEs.tle' is not included in the package (nor in 'asteRiskData'). Another file 'testTLE.txt' is included in 'asteRisk' (in the root folder, not in data), but it is not accessible either with that relative path. A robust way of referring to files included in R packages is:

system.file(subfolder,"testTLE.txt", package="asteRisk")

where 'subfolder' can be "" if the file is in the package root folder (once the package is installed), or, for instance, "./data" if it is in that subfolder.

This should be also applied to the other examples included in the R demo script and in the paper.

We apologize for the confusion. The ./data folder used in the demo script does not refer to the data folder typically found in packages, but instead to the separate data folder that was provided as supplementary material accompanying the article. The examples in the man pages of asteRisk use indeed other smaller and simpler example files, which are provided with the package, and are correctly referenced.

For the paper, in order to better illustrate the package, we decided to use other examples, more representative of real situations. We therefore distributed the required data files as supplementary material in the data folder, which should be placed in the same directory as the R demo script (ayala2021b.R). We have verified that by doing so, the script runs with no problem.

While it would certainly be possible to include additionally the data files required for the examples presented in the paper within the asteRisk package itself, we believe there are reasons not to do so. Firstly, these files would not be used or referred to anywhere in the package itself. Secondly, providing the files separately as supplementary material here ensures that these will stay always the same and as intended to run the examples, without the risk of accidental change or removal upon future updates of the asteRisk package, which would then lead to a lack of reproducibility in the examples.

However, if after considering the above reasons the reviewer and editorial team still believe it would be better to distribute these test files within the asteRisk package, we can certainly do it.

- Suggestion: In the example below Table 1 (p. 5), the parameters that were read using 'readTLE' need to be converted to other units for their use in function 'sgp4'. Wouldn't it make sense to make a function that directly converts the parameters read by the former into those needed by the latter?

We thank the reviewer for the suggestion. We have now implemented the functions required to perform the mentioned unit conversions (degrees to radians, and revolutions/day to radians/minute). These are available through the “deg2rad” and “revDay2radMin” functions. The examples throughout the paper have been modified to make use of these functions.