Dear Reviewer,

Thank you for taking the time to review our manuscript and for the comments provided. We have gone through the annotated manuscript you provided and addressed all comments, which have helped us improve the manuscript.

In what follows, we first answer your general comments and then proceed with detailed comments from the annotated PDF version of the manuscript that was provided as supplementary material.

In blue are the comments provided. Our answers are written in green.

In general, the manuscript is well structured, the language is clear and precise and figures are usually illustrative. Yet, explanations of procedures and modelling/inversion setups are rather brief and it is very difficult if not impossible at some places to follow and understand what was done exactly. In particular, parameters for magnetic inversion are introduced mainly by equations in section 2, but their meaning and effects are hardly illustrated by any words. For the examples, choice of these parameters is not explained or even omitted. The (geologic) motivation, if any, for manual adaptations in modelling of the field data remains unclear.

➔ A similar concern was raised by RC1, and our response is also similar. Our initial submission did not contain much details on aspects we thought were not essential to understanding the manuscript so as to avoid a lengthy paper. However, in the light of your comments we have added details pertaining to the definition and use of the different regularization terms. We have also provided a bit more details about the selection of the trade-off parameters.

Added: "From a geological point of view, this corresponds to adjusting our working hypothesis to a case where rocks previously identified as basement only may be less susceptible than expected."

P9 Figure 2: Being not an expert on magnetics, I can only guess from the results in Figs 6 and 7 that the type/range/... of magnetic data used here does not have sensitivity to the basement and its proper SI value. SI values stay quite close to the prior model in this region. Unfortunately, the specific resolution potential of the method for the examples is not at all discussed anywhere along the manuscript and makes it impossible for non-experts on magnetics to evaluate the findings. Please explain along with the results.

Also, if the basement is not recovered properly, because of lacking sensitivity, does it make sense to include the full model domain in estimation of model recovery parameters ERR and H? Please discuss along with figs 6 and 7 in the main text,.

➔ Sensitivity to the basement is indeed not very high in these scenarios and, importantly, the inverse problem is affected by the non-uniqueness of the solution. This is also why prior information is important in this case. Magnetic data inversion shows reasonable sensitivity to contrasts in magnetic susceptibility, meaning that although we might not be able to recover magnetic susceptibility accurately, we may still be able recover the interface between sedimentary units and the basement.

We have added the following to the first paragraph of Section 3:
"The objective of this exercise is to assess the workflow's efficacy to recover the sediment-basement interface. To this end, we rely on the magnetic inversion's sensitivity to magnetic susceptibility contrast to model the interface between highly susceptible units (basement) and rocks presenting little to no magnetic susceptibility (sedimentary units). The magnetic susceptibility model we use consists of 2D structures."

Similarly to the other reviewer, we provide our detailed answer in the annotated document where we answer your comments, corrections and suggestions point-by-point. There is however one particular comment that we answer below:

P21 l516: How fair is actually a 2D modelling approach for the magnetic data? The magnetic data seem to feature quite some 3D structures in the map of fig 10a. Could the inconsistencies between the MT prior information and magnetic data also be a result of 3D effects in either magnetic or MT data (or both) which cannot be reflected adequately in the respective modelling schemes?

➔ This is a good point, on which we did have not elaborate much but which may need a bit more information. We have added details about the meaning of the envelope of the data as shown in Figure 10, in Section 4.2.1:
"The envelope of the data is obtained from the lower and upper limits observed within the band considered in the calculation of the weighted average. As a consequence, it reflects the variability of magnetic data perpendicularly to L26. Areas with departures from a narrow envelope may be indicative of zones where the 2D hypothesis made for inversion could be challenged."

We used this as one of the possible explanations for some of the adjustments of the domains that we made.

We have added the following to the manuscript (section 4.2.2):

"..., which might also require further investigation. We note that this possible interpretation needs to be taken with caution between approximately 462 and 464 km easting as marked by the asterisk sign (*) in Erreur ! Source du renvoi introuvable.e because it corresponds to a zone of the study area where the hypothesis of a 2D model might not hold. This is corroborated by visual inspection of the vicinity of L26 beyond the greyed out area between 462 and 464 km Easting in Erreur ! Source du renvoi introuvable.a."

It could also be that 3D effects could be inferred from the analysis of the phase tensor and induction arrows, but it could be difficult to interpret.

Following you comment about tense sequence throughout the manuscript, we have carefully proof-read the document and modified the tenses where necessary to consistency with a narration using the present simple.