

Reply to the Reviewer

We thank the referee for his/her advice and suggestions/comments very helpful to improve the content and the readability of our work.

The paper shows that the thermal reconstruction can be improved making use of some geometrical constraint gained by previous GPR measurements and Born-based inversion. The method is back-upped with numerical simulation regarding a wooden (or air or steel) object embedded in a wall. The paper is of interest, even if experimental data would have been better. The set-up is not expensive and I hope that in a future work the authors will implement it.

Reply: The aim of this paper is to present a way to combined GPR measurements with long term thermal measurements. To our knowledge there is no presentation of such proposed approach in literature. To facilitate its presentation and its analysis, we decided in this paper to use simulated data for both measurement systems (Thermal and GPR) but also environmental conditions, and not measured data to focus on fundamentals and construction of the proposed coupled analysis method. Applying this method, we have succeeded in finding some simple inclusions composed of wood, air or steel. A next step will be to test and improve our method by using measured data on real site.

As for the paper at hand, it should be corrected from some refuses (see the attached file) and some notes that the authors wrote for themselves and should have erased before submitting the paper.

Reply: We have revised carefully the manuscript and eliminated any refuse and notes. We hope that now the manuscript is ready for the publication.

Moreover, the theoretical dealing could be reduced because both the equation of the thermal and GPR sensing are well assessed and known.

Reply: Thank you for your help. We have reduced the part regarding the electromagnetic modelling by erasing the well know Maxwell equations (eq. (17) and 1(18)) of the original version.

Still, about the thermal investigations, it should be specified whether some lamp is used in order to enhance the emission or purely passive data are used. In any case, it should be specified how in a real case, the same environmental condition would be guaranteed for 5 days, or alternatively how an equivalent amount of independent data could be gathered in a shorter time

Reply: Complementary sentences were added in the paper to explain why in such configuration devoted to outdoor application at the end, we do not use lamps but environmental parameter have to be monitored. About the time period duration, complementary information were also added in the paper. We can't change the thermal properties of materials, longer is the measurement period, deeper could be the information retrieved from surface measurement, but it has to be weighted by the volume and the nature of the inclusion due to heat diffusion establishment inside the material.

The reference Persico and Bernini 2005 is badly reported. Indeed the authors are Persico, Bernini and Soldovieri.

Reply: Thank you for the advice. The reference has been corrected.

There is a misprint: the same symbol is reported later on as rho with c as pedix / rho sub c

Reply: rho is the density and c the thermal capacity. It has no link with electromagnetism. To avoid confusion in the paper, the small c have been replaced by big C.