

Dear Authors,

both reviewers have agreed that the manuscript improved considerably and can be published if a few corrections are implemented:

First, figure 7 needs to be overhauled, a 1:1 line added, and the x and y axes need to have the same range. Both reviewers state that the way that it is presented, deviations from the 1:1 line are not clearly visible.

Secondly, reviewer 1 recommends to state the limitations of the MIR/FTIR method even more clearly. These are mainly the missing libraries in some regions of the globe and that it is questionable if MIR has the precision to detect changes in SOC at the field scale (much harder than predicting SOC across a range of soils). Consequently, reviewer 1 recommends to temper the claims about the general applicability in the abstract, main text and conclusion.

RESPONSE: Thank you for sharing the referee comments and for giving us the opportunity to make the suggested minor revisions for resubmission. Figure 7 has been updated to address all the referees' comments, as reported below.

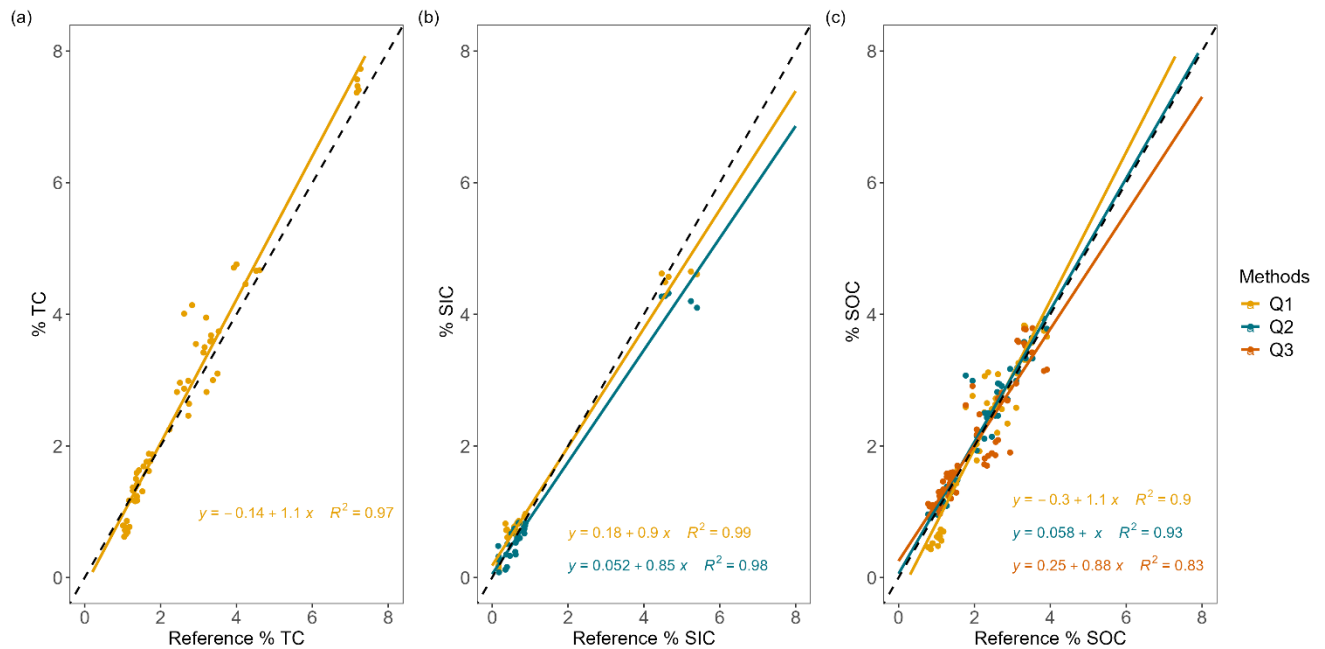


Figure 7: All quantification methods for % soil total carbon (TC), % soil inorganic carbon (SIC), and % soil organic carbon (SOC) plotted against the reference method where Q1 is predictions using Fourier transformed infrared spectroscopy, Q2 is acid fumigation, and Q3 is loss on ignition as described in detail in Fig. 1. The dashed line represents a 1:1 relationship.

To expand on the limitations of FTIR spectroscopy, we have revised L34-35 in the abstract to read “Moreover, we show promising results using FTIR spectroscopy coupled with predictive modeling for estimating % TC, % SIC, and % SOC in regions where spectral libraries exist.” We have also added text as detailed below.

Proposed text (L577): Additionally, the KSSL library used in our study was representative of the geographical region for our sample set. The effectiveness of FTIR coupled with predictive modeling depends on the accessibility of spectral distribution within the geographical area of interest. Projects may be limited by the spectral libraries available.

Proposed text (L596): Moreover, as the use of FTIR gains traction, laboratories need to be aware that model transfer from a large spectral library (like the KSSL) may be problematic if the instrumentation used to analyze the soils does not match the instrument used to build the spectral library (Safanelli et al., 2023).

Proposed text (L641): We also encourage future research to better understand if the precision of FTIR predicted SOC measurements is sufficient to detect changes in SOC at the field scale.