

Dear editor,

Thank you for your quick reply and for the consideration of our manuscript. Please find attached a corrected version of the **Manuscript (*.pdf)** and **Supplementary material (*.pdf)** file including the changes requested by the two referees. The referee's comments have been addressed point-by-point in separate replies as part of the interactive discussion.

Changes made in the manuscript are underlined in the attached **Author's track-changes file (*.pdf)** and are enlisted below

Sincerely,

Eva Kanari, on behalf of all co-authors

List of changes made in the manuscript:

- Lines 159–161: Addition of a more detailed explanation of the Rock-Eval technique and the lack of need for pre-processing of CaCO_3 -containing samples for this method (s. new Supplementary Material Figure 2).
- Lines 222–231: Section 2.6.2 has been re-written and a more detailed step-by-step description of the use of the $\text{PARTY}_{\text{SOC}}$ machine-learning model has been added.
- Lines 246–251: We have added a small section (2.7) in the Materials and Methods part explaining in detail the conversion from stable SOC proportion to stable SOC content (i.e., the size of the stable carbon pool).
- Lines 379–383: We have added a few sentences for a more thorough discussion of the potential of simple models compared to more complex ones with a more precise use of the references.

Throughout the manuscript

- homogenization of previously used terms describing the stable SOC proportion estimated with different methods (i.e., from “AMG C_s/C_0 ” to “AMG stable SOC proportion” and from “Rock-Eval-predicted centennial stable SOC proportion” and “ $\text{PARTY}_{\text{SOC}}$ predicted centennial stable SOC” to “ $\text{PARTY}_{\text{SOC}}$ centennial stable SOC proportion”), particularly in section 3.1.
- Also for simplification purposes previous mentions of “Rock-Eval-based initialization” were changed to “ $\text{PARTY}_{\text{SOC}}$ -based initialization” throughout the manuscript, particularly in section 3.2 and in the Discussion.
- Correction of units throughout the manuscript (i.e., from CH to HC for hydrocarbons, from tC to MgC for SOC stocks)
- Correction of several typos

List of changes made in the Supplementary Material:

- Supplementary Material Figure 2: New, describing the Rock-Eval method
- Supplementary Material Table 1: We provide additional information on soil bulk density and on the considered soil mass that was used for the calculation of SOC stocks.