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The Global Long-Term Agricultural Experiment Network

Carolina Cardoso Lisboa^{1,2}, Jonathan Storkey^{1,3}, Carlos Eduardo Pellegrino Cerri^{4,5}, Christian Thierfelder^{4,6}, Juan Andres Quincke^{4,7}, Pauline Chivenge^{4,8}, and Sieglinde Snapp^{4,9}

¹Rothamsted Research, Sustainable Agriculture Science, United Kingdom of Great Britain and Northern Ireland (carolina.lisboa@rothamsted.ac.uk)

²GLTEN-Co-ordinator (glten@rothamsted.ac.uk)

³GLTEN-Principal Investigator (jonathan.storkey@rothamsted.ac.uk)

⁴GLTEN-Steering Committee

⁵Escola Superior de Agricultura “Luiz de Queiroz”, University of São Paulo, Brazil (cepcerri@usp.br)

⁶International Maize and Wheat Improvement Center, CIMMYT, Zimbabwe (c.thierfelder@cgiar.org)

⁷Instituto Nacional de Investigación Agropecuaria, Uruguay (aquincke@inia.org.uy)

⁸International Rice Research Institute, Philippines (p.chivenge@irri.org)

⁹Michigan State University, United States (snapp@msu.edu)

Balancing food production with environmentally sustainable land management can have important climate change mitigation co-benefits. Recent reports, including the IPCC latest Special Report, launched at the COP 25 in December 2019, have highlighted the significant role of soil carbon (C) stocks in agricultural soils in achieving CO₂ zero emissions and contributing to CO₂ removal. However, to measure the soil C balance (C-gains and C-losses), a deep understanding of the processes governing the changes in soil C stocks in agricultural systems is required as well as knowledge on the impact of management over long and short time scales under distinct climate conditions. An understanding of the mechanisms underpinning these processes depends on robust evidence-based datasets that can be applied to several different models to model soil C-dynamics over time and make predictions upon future scenarios. The datasets from long-term experiments (LTEs) can be extremely valuable to facilitate the evaluation of alternative food production systems impact/effect on soil health, as such soil C stocks. Employing modeling tools to analyse these data, would lead to better evaluation of land use and management practices and its environmental impacts around the globe. With the aim of supporting the agricultural science community in meeting this and related objectives, the Global Long-Term Agricultural Experiment Network (GLTEN) was launched in October 2019. The main goal of the network is to assemble and harmonize, following FAIR Data Principle (findable, accessible, interoperable and reusable), metadata from LTEs through the online GLTEN-Metadata Portal (<https://glten.org/>). This initial scientific investigation of the data shared between the experiments focusses on soil C data analyzed using free available tools to exploit and compare the trade-offs between several agricultural practices and C-offset given the distinct soil type and climate conditions. With the support of the GLTEN-members, we will start these joint analyses applying the Carbon Benefits Tools (<https://banr.nrel.colostate.edu/CBP/>) and the RothC Model (<https://www.rothamsted.ac.uk/rothamsted-carbon-model-rothc>). The progress of this

collaborative work relies on the commitment and expertise of the GLTEN-members and we expect that the outcome from this investigation will support the knowledge refining and advancing the development of existing modeling tools. Furthermore, we will demonstrate the potential for the GLTEN to provide a platform that supports and facilitates collaborative research among the community.