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AGROGEO

Agrogeophysical modelling of managed grasslands

Alejandro Romero-Ruiz[1], **Dave O'Leary**[2], and **Thomas Keller**[1]

[1]Agroscope, [2]Teagasc

Abstract

Geophysical methods help understanding soil processes and properties at management scales beyond what is possible with traditional monitoring techniques such as soil sampling. In managed grasslands, geophysical methods can assist for field-scale characterization of soil compaction patterns produced by grazing animals affecting soil structure, soil water and nitrogen dynamics (impacted by cattle urination). However, the application of geophysical methods is typically focused on soil bulk properties or moisture mapping and further assessment of soil functioning is often uninvestigated. In this study, we explore how integrated modelling of grazing patterns, soil structure dynamics, soil processes and related electromagnetic induction (EMI) data may provide valuable insights of nitrous oxide (N_2O) emissions in managed grasslands. This is achieved by using EMI data to constrain soil structure dynamics in an agroecosystem modelling framework, ultimately allowing to make predictions of key soil functions. This approach was tested using EMI data and management information from a dairy farm in central Ireland. The EMI data suggests that N_2O emissions from compacted zones (occupying about 3-25% of the total area of the studied paddocks) are 2.5 higher than those from non-compacted zones. This is consistent with profile-scale studies reported in the literature for compacted grasslands. Linking agricultural management and geophysical data (through agroecosystem modelling) may offer new means for large-scale and long-term testing and monitoring of the environmental impacts of management for different agricultural systems.

Keywords EMI, mapping, soil compaction, soil functioning, N2O emissions, agroecosystem modeling, field experiment

Poster Presentation

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Correspondence to
Alejandro Romero-Ruiz
alejandro.romero@agroscope.admin.ch