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Assessing soil ecosystem services using empirical indicators

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Studying the soil from the ecosystem services (ES) approach is a way to embrace the complexity and multiple functions of the soil systems and its interactions with the environment and with humans. The ES approach is ideal for developing a sustainable and integrated land management and to concern people about the value of conserving soil. However, this approach is generally used up to know only for soil provisioning services as well as the potential for carbon storage, but not for other services such as soil erosion or water buffering. In addition, those studies carried out are focussed in coarse spatial scale, without identifying the spatial or temporal variability. One of the reasons of this bias arises from the difficulties of obtaining a broad and reliable dataset of indicators from empirical sources. This constrain is sorted out with the action of SOGLO project (the Soil System Under Global Change), an interuniversity attraction pole project (2012-2017) involving different universities from Belgium. The project brings the opportunity to obtain a unique soil dataset for an improved and integrated analysis of the feedbacks between the soil system and fluxes of sediment, carbon (C), nutrients and water in response to anthropogenic forcings at different spatial and temporal scales in experimental sites in both Brazil and in Belgium. Within this broad project, the objective of the present work is to elucidate how different land uses in Belgium (forest, grassland, cropland with conventional tillage and with reduced tillage both with crop rotation) affect the delivery and trade-off of soil ecosystem services. We did this by measuring and comparing a range of indicators of soil ecosystem services in different lands uses during a range of 5 years. Specifically we investigated quantity of SOC in the soil and DOC in the soil solution and at the discharge point (SOC storage service/water buffering services); Si, N, P in the soil, dissolved in the soil solution and at the discharge point (regulating of P, N, Si cycles/ water buffering services); infiltration capacity, water retention curves and soil erosion (soil stability/water buffering services) and vegetation cover (biomass production service). We then examined the relationships and trade off between services spatially and seasonally. The results will be given during at the conference session but our hypothesis is that the performance of soil services is related even seasonally, and the degradation of one service enhances de degradation of the others.