Changes in Land Cover Impact New Zealands Soil Carbon Budget: An Analysis at Multiple Scales. (S05-scott144603-Oral)

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Abstract:

In New Zealand, recent conversion of pastures to woody vegetation could result in soil C changes. We developed an IPCC-based soil Carbon Monitoring System (CMS) that stratifies New Zealand by soil type, climate, land-use and an erosivity index (slope H precipitation), and then uses national soil pedon data to estimate equilibrium soil C levels for combinations of factors (cells). The system can be used to quantify national soil C stocks (1130+-40, 1300+-60, and 1300+-160 Tg C for 0-0.1, 0.1-0.3, and 0.3-1 m depths, respectively), and, using a GLM, to predict soil C changes (and uncertainty) associated with land-use change. An additive model, using Soil-Climate+Land Cover+Erosivity Index, gave the best prediction of 0-0.1 and 0-0.3 m soil C (R2=0.37 and 0.44, respectively). Predicted soil C stocks agreed well with stratified sampling at regional (24,000 ha) scales across a climatic gradient. In a 6000 ha area with several land-cover types, the CMS predicted soil C stocks for 15 out of 19 soil-climate/land-use combinations. Between 1990-2000, the CMS indicates soil C losses of 0.9+-0.4 Tg C/y; uncertainties include poor estimates of area changes and no soil C data for some important cells.

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