Variability of soil carbon-flux and –pool relations, as affected by biotic and abiotic factors

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This study aims to derive, as an overall ecosystem diagnostic , the relationships between carbon fluxes and pools within the whole ecosystem and possibly within different compartments (e.g. litter, mineral soil). We hope to substantially improve the study by Sanderman et al (2003), where eddy flux measurements were used to derive SOM decay constants (k) for a number of upland forests. The authors then related the k-values to variability in mean annual air temperature and precipitation. We would like to compute k or related diagnostics from more direct measurements of Rh and SOC across a number of sites located in different climate zones and ecosystem types. Finally, once the values are computed, we would use multivariate statistical analysis to see how the different k values vary among climate zones, ecosystem types, within the soil profile, and if any of the observed variability can be related to climatic, edaphic or physiological variables (i.e. temperature, moisture, soil texture, nutrients, species composition).

The results of this proposed study would benefit those trying to create and improve models on soil carbon dynamics by providing empirical constraints on the models. This synthesis would also add to our understanding of spatial variability of SOC dynamics and controls, helping to improve and/or direct future studies on soil carbon cycling.

Reference:
Sanderman J., Amundson R.G., Baldocchi D. (2003) Application of eddy covariance measurements to the temperature dependence of soil organic matter mean residence time. Global Biogeochemical Cycles, 17: doi: 10.1029/2001GB001833.