



An Assessment of Soil Carbon at the Hillslope Scale – Australian Examples

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The soil carbon pool is a key element within the global carbon cycle, with terrestrial carbon fluxes accounting for more than half of the carbon transferred between the atmosphere and the earth's surface. Despite its significance, there remains a lack of understanding of the carbon cycle at regional and sub-regional (e.g. catchment and hillslope) scales. This lack of understanding compromises the accuracy of carbon budgeting and accounting efforts, which are important for the development of viable carbon sequestration strategies that aim to reduce atmospheric CO₂ concentrations and thus mitigate the effects of climate change. While much work has been done at the point scale, particularly from an agricultural perspective, in this paper we examine soil organic carbon and nitrogen at the hillslope scale for catchments within Australia, covering different climatic conditions, geology and land use management practices. We relate soil erosion and deposition (using the ¹³⁷Cesium technique), textural properties and hillslope position to evaluate soil organic carbon content. Results indicate only weak relationships with any of the catchment properties examined (i.e. soil erosion and deposition, textural properties and hillslope position). This finding suggests further work is required to better understand soil carbon and nitrogen at the point and hillslope scales. In particular, this knowledge is required if we are to extrapolate soil carbon assessments to the larger sub-catchment and catchment scales, which are especially important for the development of carbon budgets and subsequent modelling applications.

Keywords: soil organic carbon; hillslope; soil erosion; catchment modelling