

How does soil organic carbon vary across large catchments? An assessment of geomorphic and hydrologic influences

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Soil organic carbon (SOC) concentration is presumed to vary at the hillslope and catchment scale however there are few studies that have examined SOC at the large catchment scale as well as over a number of years. Here we quantify SOC across two large catchments which have similar soils, topography, orientation and landuse in south-eastern Australia. These catchments of area 575 km² and 675 km² display similar patterns of SOC which significantly increases with elevation in line with the rainfall gradient. One catchment, the 575km² Krui catchment has been sampled in 2006 and 2014 with no significant difference in SOC concentration found despite 10 years of drought and extreme rainfall events followed by above average rainfall. SOC was also found to be correlated with vegetation as quantified by both Landsat and MODIS satellite data with vegetation patterns found to relatively stable over the study period. Further work will investigate this relationship as it is likely that the increased rainfall with elevation is a major driver in the variation in vegetation pattern. SOC concentration was also found to be related to soil erosion and deposition as quantified by the environmental tracer ¹³⁷Cs. Overall the results suggest that SOC is robust at decadal time scales and is strongly spatially related to topography. Model results based on topographic relationships of the spatial distribution of SOC will be demonstrated.