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Limited opportunities for management-induced soil carbon storage in New South Wales, Australia.

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Soil management has been promoted internationally and in Australia as a means of storing additional soil carbon to offset greenhouse gas emissions (GHG) elsewhere. Despite considerable investment in research in Australia, difficulties with reliable detection and estimation of soil carbon change remain as significant barriers to soil carbon accounting and trading. Here we present examples from an extensive dataset across the diverse production landscapes of New South Wales, Australia generated from both the NSW Statewide Soil Monitoring Program and the National Soil Carbon Research Program. Issues relating to climate, spatial variability, historical and contemporary land-management are highlighted to illustrate the challenges of detecting and estimating management-induced soil carbon change. We further demonstrate that, where it is possible to detect soil carbon change resulting from agricultural management, the quantities stored are unlikely to make a significant contribution to reductions in net greenhouse gas emissions. Historical factors and non-agricultural land-use options are likely to provide more significant potential for long-term soil carbon storage in this environment.