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Soil organic matter priming effects cannot be factored together with the established respiration response to warming

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Priming of native SOM mineralisation as a consequence of labile C inputs is a poorly understood process. This study aimed to quantify temperature effects on SOM mineralisation and determine the response of priming. Agricultural soils were incubated at 15°C, 20°C, 25°C and 30°C. Following a 14-day stabilisation period of 14 days, soils were amended with labile carbon additions of 13C enriched glucose. Partitioning of the CO_2 efflux into the labile C4 and more recalcitrant C3 carbon sources showed increased C3 utilization with increasing temperature. Real, positive priming effects were observed for each temperature. Basal SOM mineralisation (i.e. without labile C-additions) was positively correlated with increasing temperature, however priming was temperature insensitive. It is considered that priming processes are driven by the input of the labile C-source, which was the same for each temperature. This explains why the priming effect is similar, despite temperature change. Results demonstrate that priming forms an important component of soil respiration, yet does not respond to temperature in the same way as basal SOM mineralisation. This suggests that separate mechanisms are responsible for priming. These findings are not accounted for by standard soil incubation studies or included in current soil carbon models which consider all sources of respiration to have the same temperature response.