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Impact of warming on soil respiration in Andean rain forests over a transect spanning 3 km in altitude, in Peru

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An altitudinal gradient offers unique potential to make a field-based of the effects of climate on soil respiration and its components. We used a soil translocation experiment to investigate the effects of temperature change on forest soil respiration rates in Andean Peru. Soil cores from four elevations (3030 m, 1500 m, 1000 m, and 200 m asl) along a rain forest transect spanning 13.9 °C in mean annual temperature were exchanged and monitored for components of respiration and soil composition; undisturbed soil and control cores were also measured at each elevation. Whilst mean daytime soil respiration was not significantly different among elevations, the diurnal range and total annual efflux of carbon varied. The heterotrophic temperature sensitivity in respiration (Q10) was higher at the lowest- and highest-elevation sites, and increased over time as the most labile carbon pool was lost. Physical fractionation of the soil appeared to a be better method to reveal differences in temperature sensitivity than total carbon content measurements or chemical analysis by NMR.