

Quantifying the contribution of soil organic matter turnover to forest soil respiration using natural abundance  $\delta^{13}\text{C}$

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Kānuka, 20 years old, 12 m tall



**Ecosystem net carbon balance**

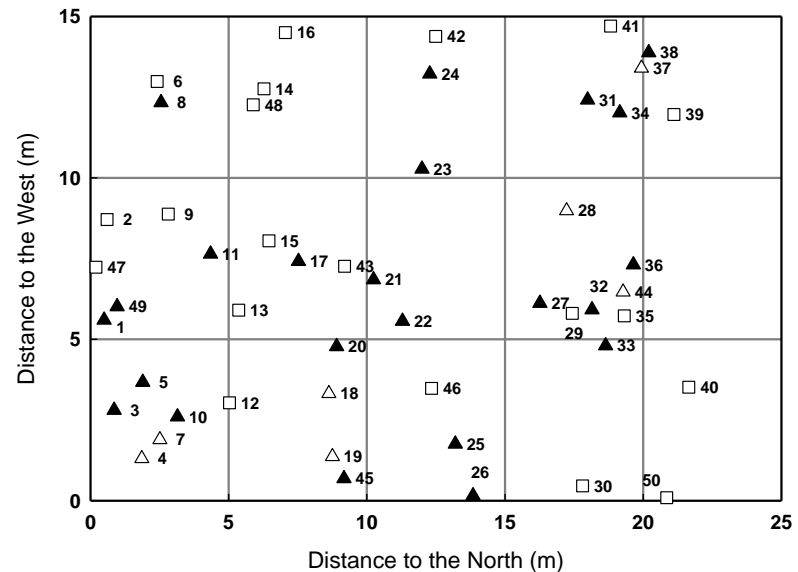
$$C = A - R$$

$$R = R_f + R_s$$

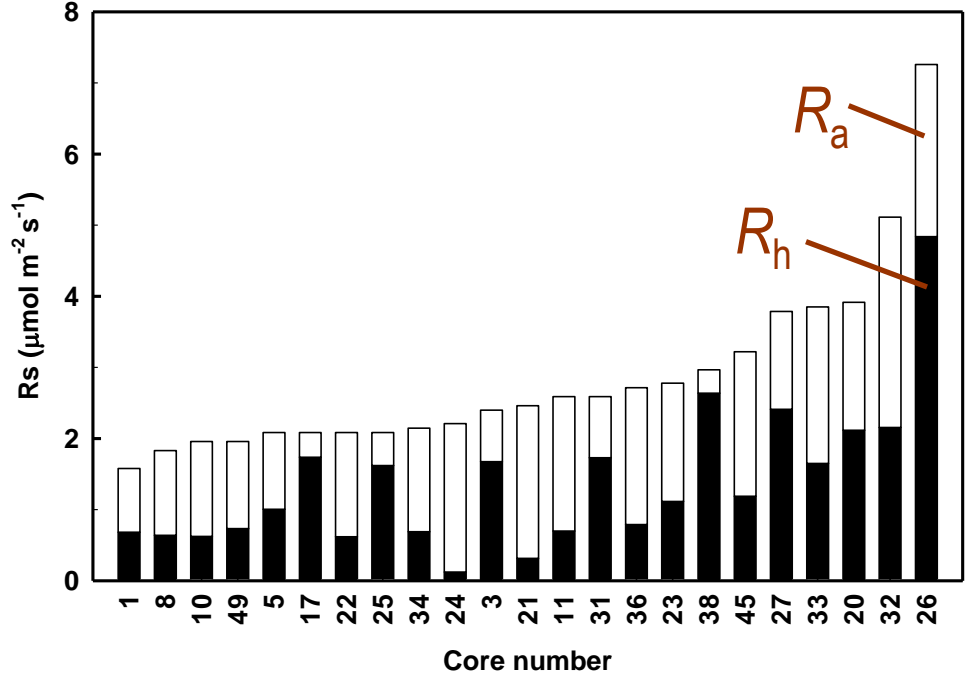
$$R_s = R_a + R_h$$

Partitioning  $R_a$  &  $R_h$  is challenging

Marsden Fund



Mean ( $\pm$  SE)  $\delta^{13}C R_h$   $2.5 \pm 1.1$  ‰ enriched compared with  $\delta^{13}C R_a$



Mean ( $\pm$  SE) proportion of  $R_s$  attributed to  $R_h$  was  $0.49 \pm 0.20$

33% of variability in  $R_s$  across the site was accounted for by root length density, site and environmental variables

Careful sampling and natural abundance isotope analysis of soil surface respired air and incubations of roots and soil can be used to estimate the fraction of  $R_h$  in undisturbed conditions