Model M2-dif steady state equations

The equilibrium solutions to the C pools of model M2-dif are given by:

$$C_P = K_D r_{ed} z(-2gI_{ml}f_{ge}f_{ug}r_{md} + 2gI_m f_{ug}r_{md} - 2gI_{sl}f_{ge}r_{mr}f_{ug} - 2gI_{sl}f_{ge}f_{ug}r_{md} + 2gI_{sl}r_{mr} + 2gI_{sl}r_{md} - I_{ml}f_{ge}f_{ug}r_{ed}r_{md} + I_{ml}f_{ug}r_{ed}r_{md} - I_{sl}f_{ge}r_{mr}f_{ug}r_{ed} - I_{sl}f_{ge}f_{ug}r_{ed}r_{md} + I_{sl}r_{mr}r_{ed} + I_{sl}r_{ed}r_{md})/(gI_{ml}V_D f_{ge}r_{mr}f_{ug} + gI_{ml}V_D f_{ge}f_{ug}r_{md} + 2gI_{ml}f_{ge}f_{ug}r_{ed}r_{md} - 2gI_{ml}f_{ug}r_{ed}r_{md} + gI_{sl}V_D f_{ge}r_{mr}f_{ug} + gI_{sl}V_D f_{ge}f_{ug}r_{md} + 2gI_{sl}f_{ge}r_{mr}f_{ug}r_{ed} + 2gI_{sl}f_{ge}f_{ug}r_{ed}r_{md} - 2gI_{sl}r_{mr}r_{ed} - 2gI_{sl}r_{ed}r_{md} + I_{ml}f_{ge}f_{ug}r_{ed}^2 r_{md} - I_{ml}f_{ug}r_{ed}^2 r_{md} + I_{sl}f_{ge}r_{mr}f_{ug}r_{ed}^2 + I_{sl}f_{ge}f_{ug}r_{ed}^2 r_{md} - I_{sl}r_{mr}r_{ed}^2 - I_{sl}r_{ed}^2 r_{md}) \quad \text{(A1)}$$

$$C_D = -z(r_{mr} + r_{md})/(gV_U f_{ug}(f_{ge} - 1)) \quad \text{(A2)}$$

$$C_M = f_{ug}(I_{ml}f_{ge} - I_{ml} + I_{sl}f_{ge} - I_{sl})/(f_{ge}r_{mr}f_{ug} - r_{mr} + f_{ug}r_{md} - r_{md}) \quad \text{(A3)}$$

$$C_{ED} = -gf_{ge}f_{ug}(I_{ml}r_{mr} + I_{ml}r_{md} + I_{sl}r_{mr} + I_{sl}r_{md})/(r_{ed}(2gf_{ge}r_{mr}f_{ug} - 2gr_{mr} + 2gf_{ug}r_{md} - 2gr_{md} + f_{ge}r_{mr}f_{ug}r_{ed} - r_{mr}r_{ed} + f_{ug}r_{ed}r_{md} - r_{ed}r_{md})) \quad \text{(A4)}$$

$$C_{EM} = -f_{ge}f_{ug}(gI_{ml}r_{mr} + gI_{ml}r_{md} + gI_{sl}r_{mr} + gI_{sl}r_{md} + I_{ml}r_{mr}r_{ed} + I_{ml}r_{ed}r_{md} + I_{sl}r_{mr}r_{ed} + I_{sl}r_{ed}r_{md})/(r_{ed}(2gf_{ge}r_{mr}f_{ug} - 2gr_{mr} + 2gf_{ug}r_{md} - 2gr_{md} + f_{ge}r_{mr}f_{ug}r_{ed} - r_{mr}r_{ed} + f_{ug}r_{ed}r_{md} - r_{ed}r_{md})) \quad \text{(A5)}$$

In these equations, I_{ml} and I_{sl} are metabolic and structural litter input, which represent litter additions to the C_D and C_P pools, respectively.

Supplementary figures

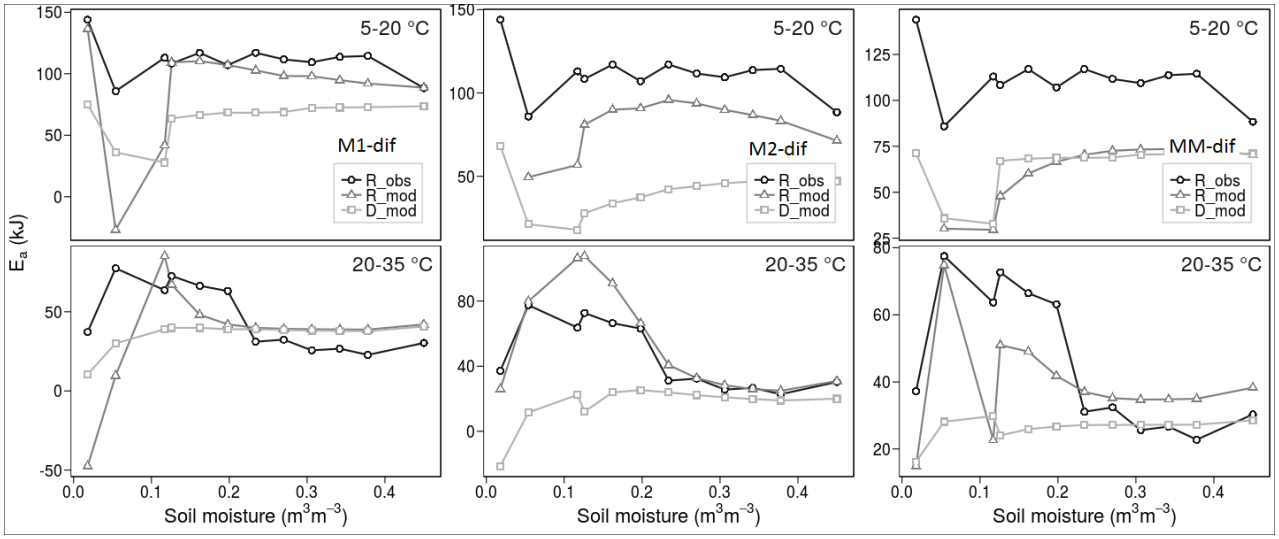

Figure S1: Relationships of apparent activation energies against soil volumetric moisture content. Values are given for measured and modelled respiration and for modelled decomposition. Each plot compares observed values against a different calibrated model (M1-dif, M2-dif and MM-dif). Apparent activation energies are shown for the temperature ranges 5-20 (top panel) and 20-35 °C (bottom panel).

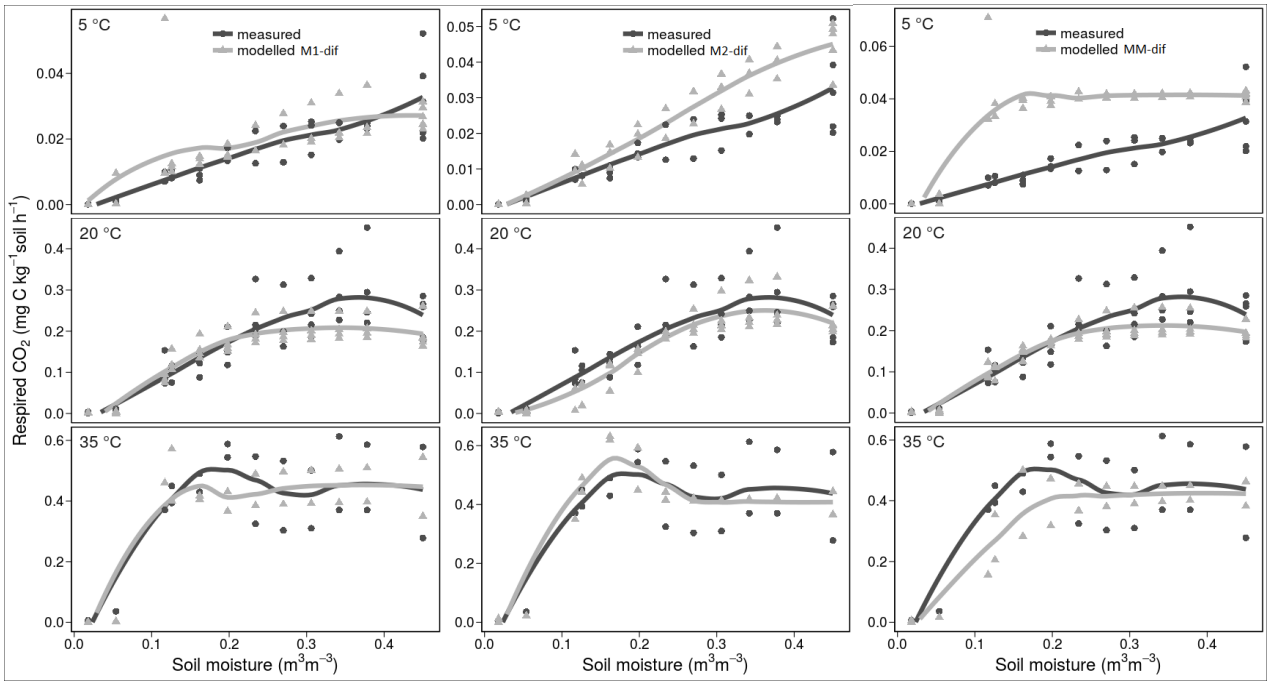

Figure S2: The relationship between respiration rates and soil moisture content shown for measured and modelled values. Each plot compares the measurements a different model (M1-dif, M2-dif, MM-dif). Lines are a smooth loess fit to show the average relationship.

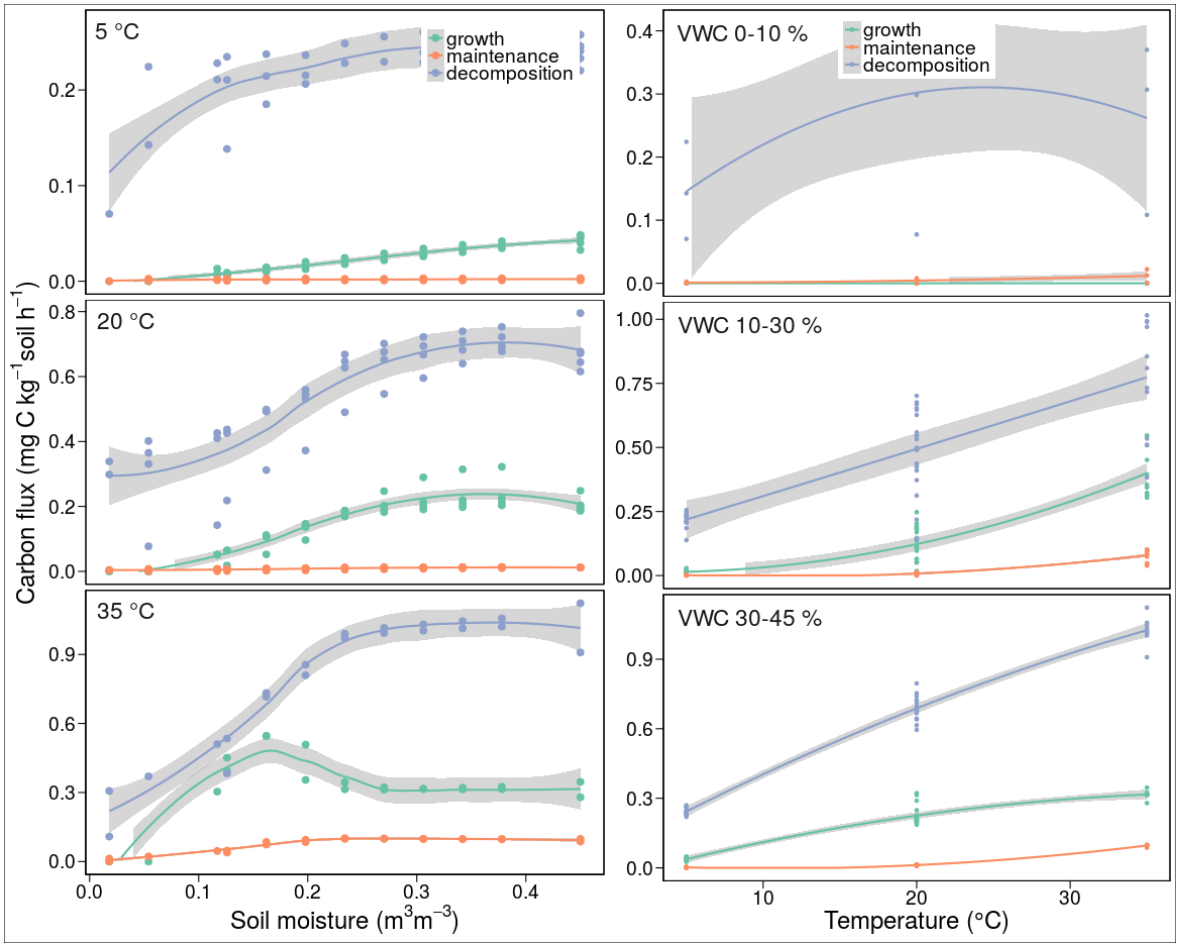

Figure S3: Respiration (growth and maintenance) and decomposition fluxes modelled using M2-dif against soil moisture (left plot) and soil temperature (right plot). Shaded areas denote the 95% confidence intervals from a loess fit.