

Supplementary Material

Leaf gas exchange and bean quality fluctuations over the whole canopy vertical profile of Arabica coffee cultivated under elevated CO₂

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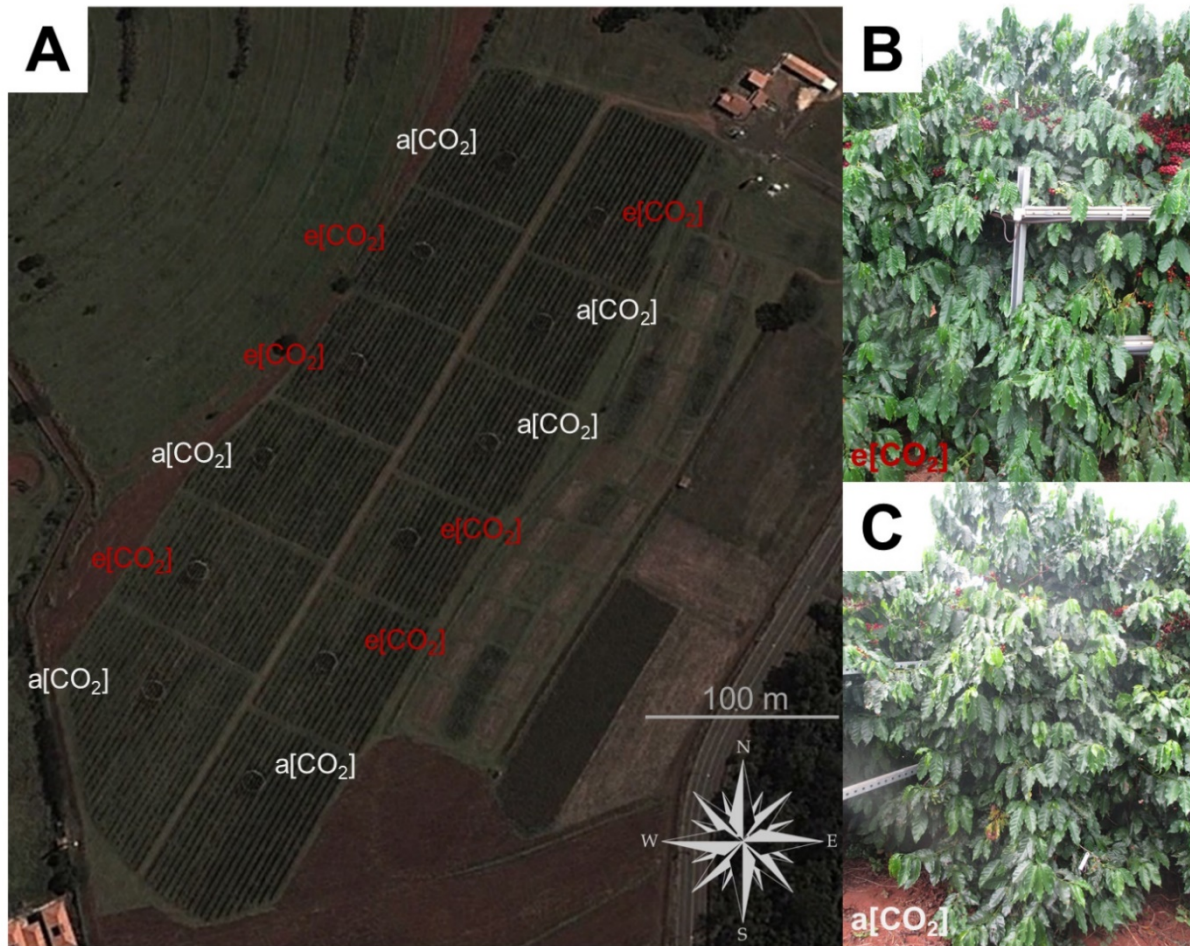


Fig. S1. (A) FACE dispositive with 12 rings, 6 with additional CO_2 – $e[\text{CO}_2]$ (about $550 \mu\text{L CO}_2 \text{ L}^{-1}$), and 6 with current air $[\text{CO}_2]$ – $a[\text{CO}_2]$, at 7 ha of *C. arabica* cv 'Catuaí Vermelho IAC 144' in 2011. View of the ring and canopy structure in April 2016 of one (B) $e[\text{CO}_2]$ and (C) $a[\text{CO}_2]$ ring part.

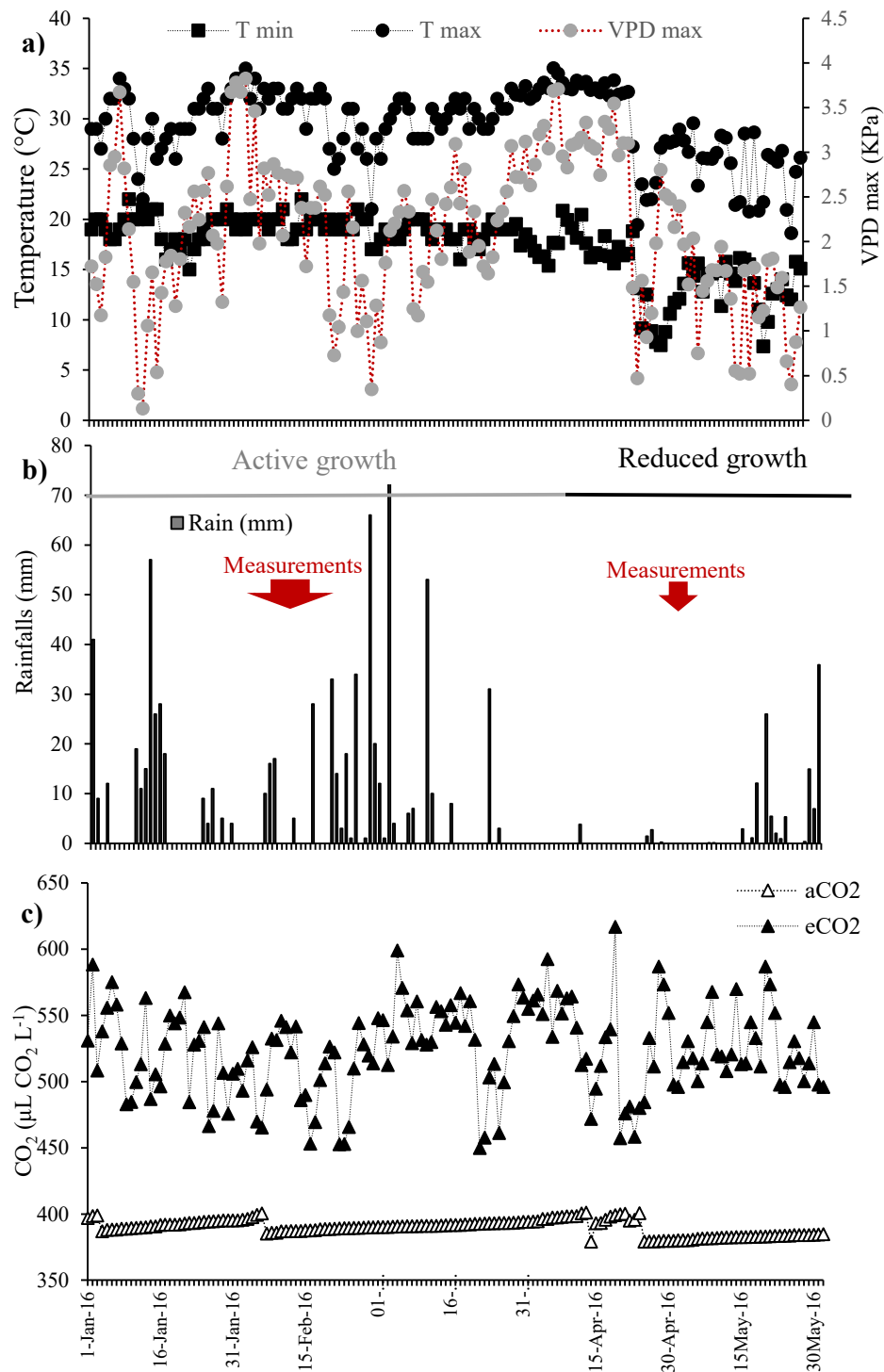


Fig. S2. Dynamics in: (a) average daily air maximum and minimum temperatures (°C) and estimated maximum vapor pressure deficit at midday (VPDmax, KPa), (b) daily rainfall (mm), (c) daily CO₂ under elevated (e[CO₂]) and actual (a[CO₂]) CO₂ treatments (µL CO₂ L⁻¹) registered inside the FACE octagons from January 2016 to May 2016. Only daylight injection of CO₂ was applied when plant CO₂ assimilation occurred. Active and reduced coffee growth seasons are indicated, as the periods of measurements.

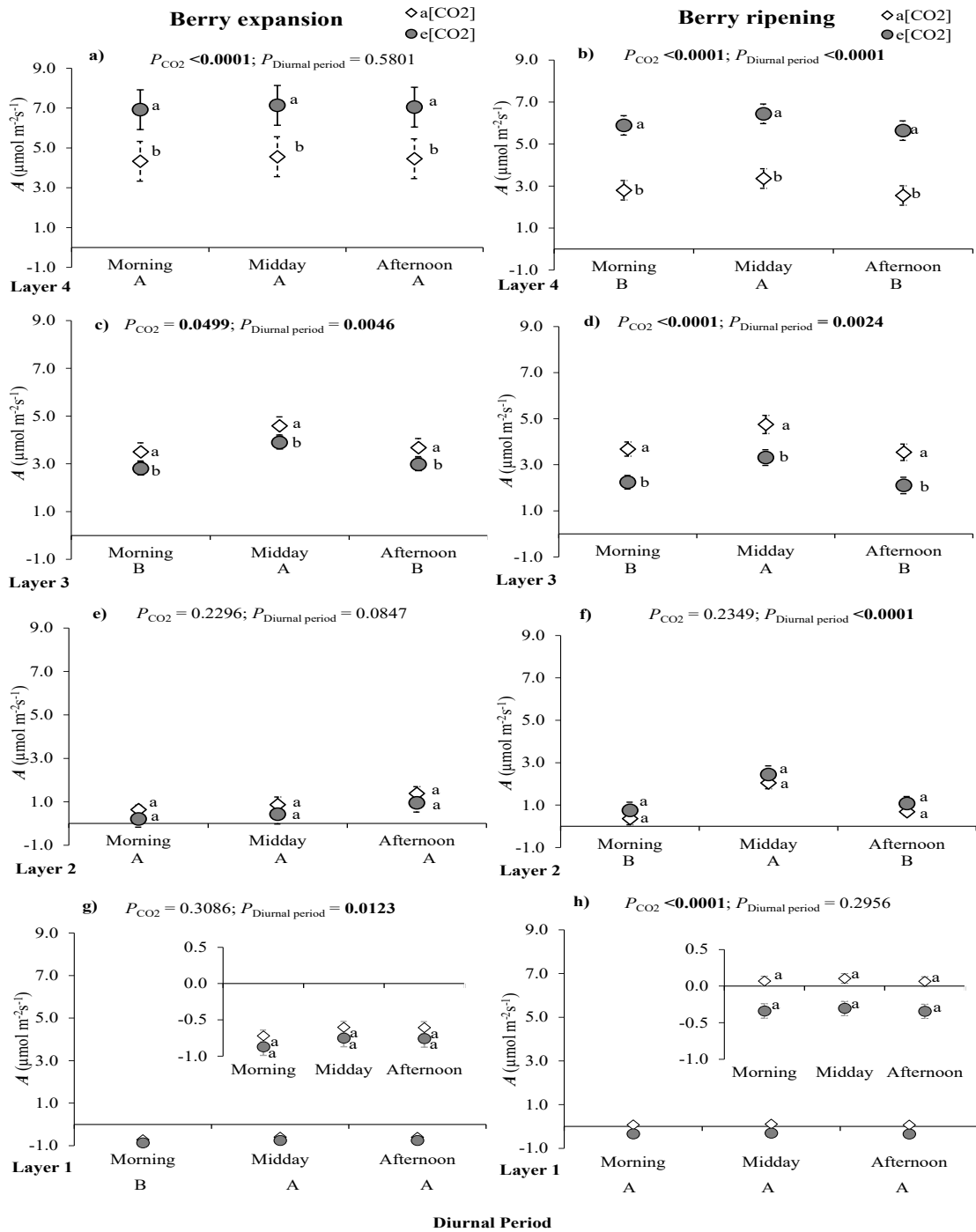


Fig. S3. Leaf net photosynthetic CO₂ assimilation (A , $\mu\text{mol m}^{-2} \text{s}^{-1}$) estimated over the whole-canopy vertical profile of coffee plants (Layer 1 < 50 cm, Layer 2: 51–100 cm, Layer 3: 101–150 cm, Layer 4 >151 cm) during berry expansion (a, c, e, g) and berry ripening (b, d, f, h). Plants were cultivated under elevated (e[CO₂]) or actual (a[CO₂]) atmospheric CO₂. Values represent the mean \pm s.e. ($n = 8$). P -values for the effects of [CO₂] and diurnal periods ≤ 0.05 were considered significant and marked in bold. When different, lower case letters indicate differences between CO₂ levels. Upper case letters below the x-axis indicate significant differences between diurnal periods.

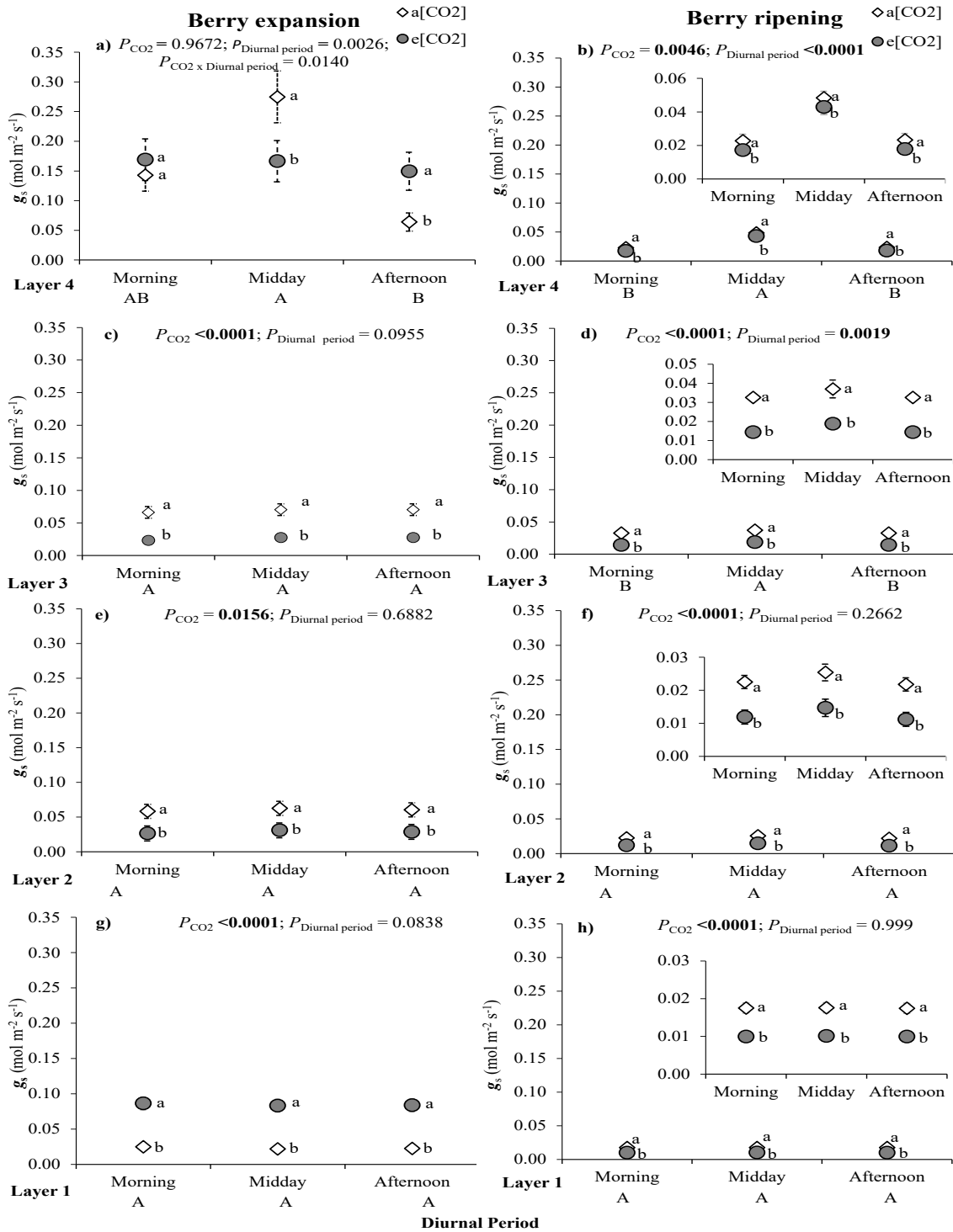


Fig. S4. Stomatal conductance (g_s , $\text{mol m}^{-2} \text{s}^{-1}$) estimated over the whole-canopy vertical profile of coffee plants (Layer 1 < 50 cm, Layer 2: 51–100 cm, Layer 3: 101–150 cm, Layer 4 >151 cm) during berry expansion (a, c, e, g) and berry ripening (b, d, f, h). Plants were cultivated under elevated ($e[\text{CO}_2]$) or actual ($a[\text{CO}_2]$) air CO_2 . Values represent the mean \pm s.e. ($n = 8$). P -values for the effects of $[\text{CO}_2]$ and diurnal periods ≤ 0.05 were considered significant and marked in bold. When different, lower case letters indicate differences between CO_2 levels. Upper case letters below the x-axis indicate significant differences between diurnal periods.

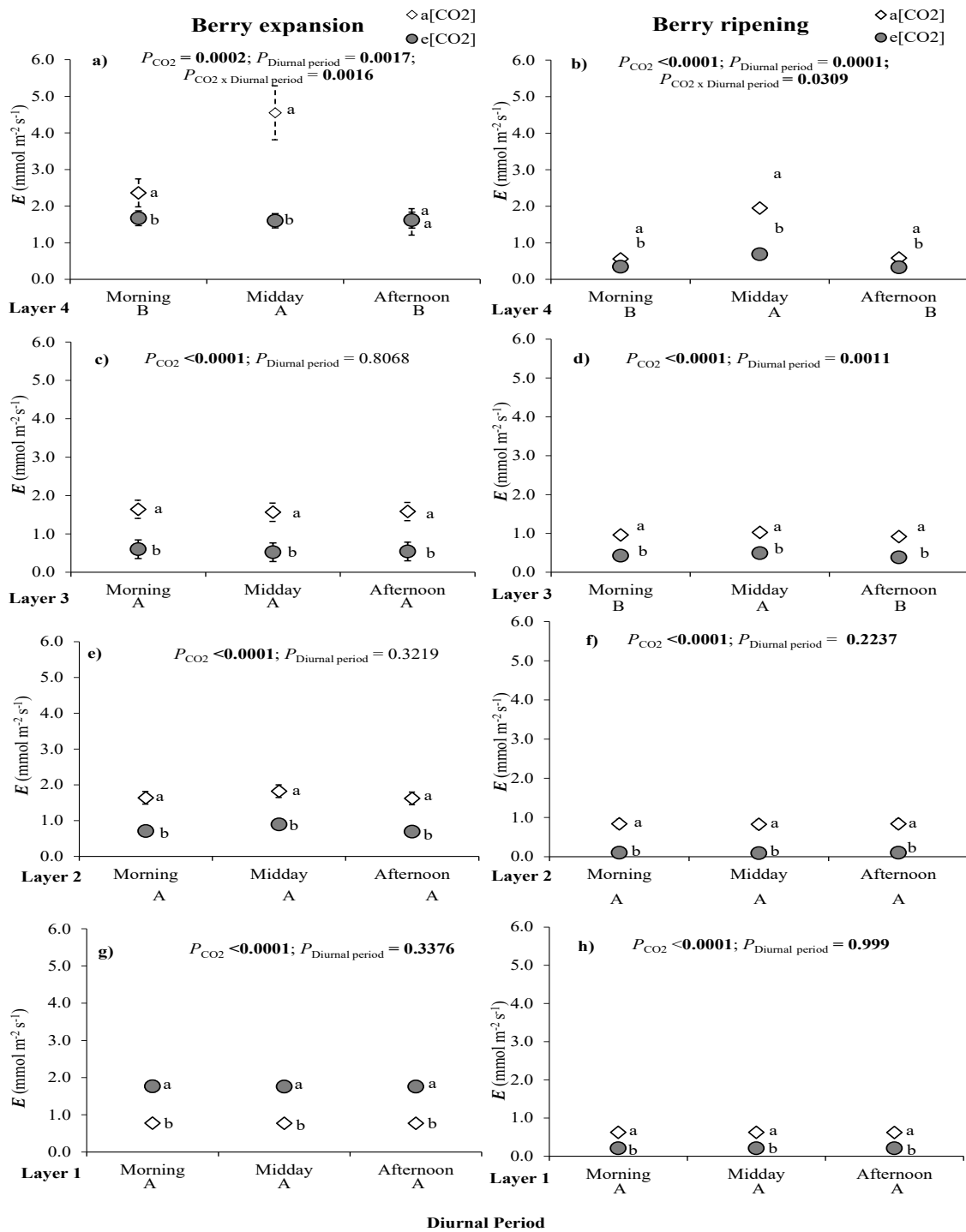


Fig. S5. Leaf transpiration (E , $\text{mmol } \mu\text{mol}^{-1}$) estimated over the whole-canopy vertical profile of coffee plants (Layer 1 < 50 cm, Layer 2: 51–100 cm, Layer 3: 101–150 cm, Layer 4 >151 cm) during berry expansion (a, c, e, g) and berry ripening (b, d, f, h). Plants were cultivated under elevated (e[CO₂]) or actual (a[CO₂]) air CO₂. Values represent the mean \pm s.e. ($n = 8$). P -values for the effects of [CO₂] and diurnal periods ≤ 0.05 were considered significant and marked in bold. When different, lower case letters indicate differences between CO₂ levels. Upper case letters below the x-axis indicate significant differences between diurnal periods.

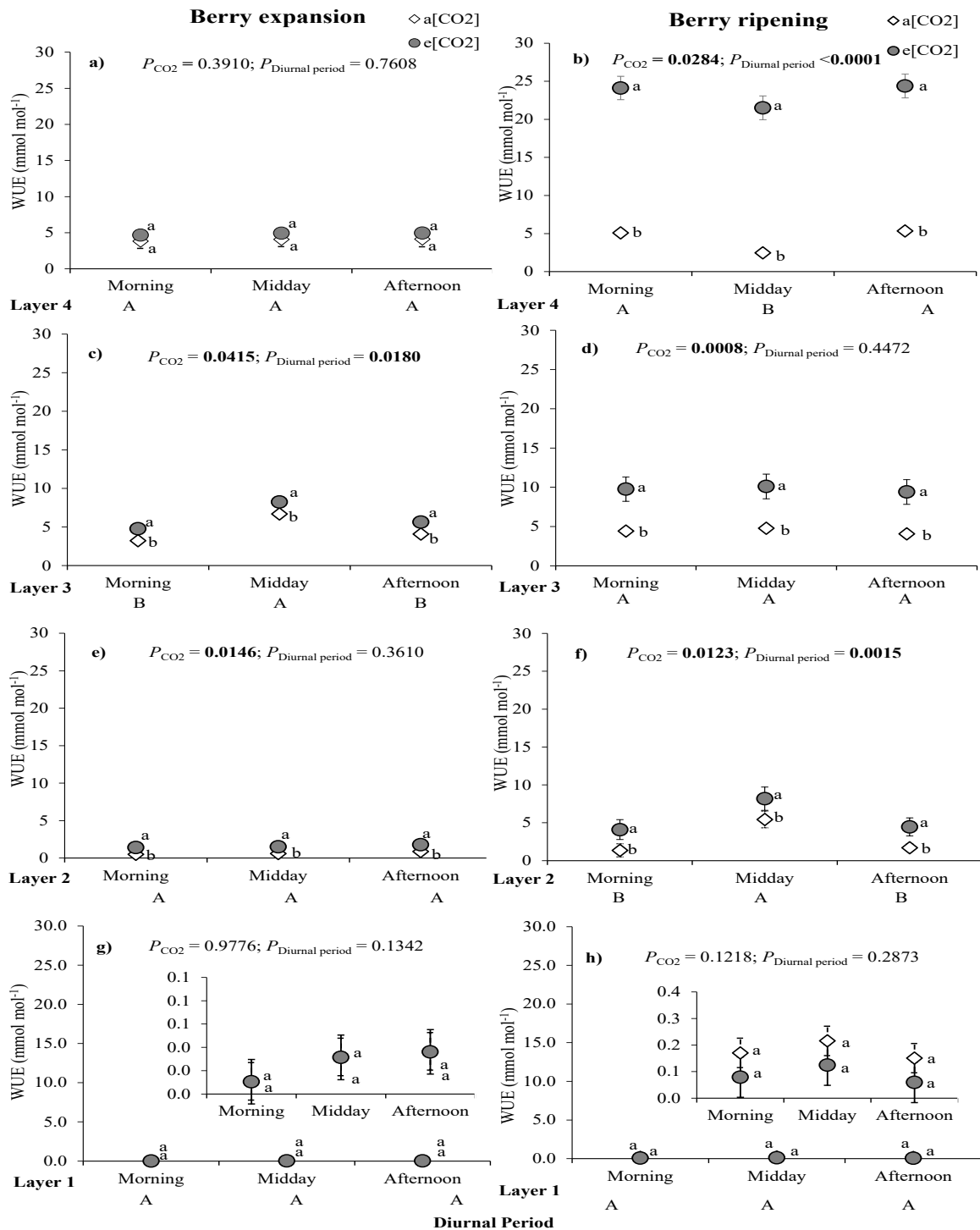


Fig. S6. Water use efficiency (WUE, mol mol⁻¹) estimated over the whole-canopy vertical profile of coffee plants (Layer 1 < 50 cm, Layer 2: 51–100 cm, Layer 3: 101–150 cm, Layer 4 >151 cm) during berry expansion (a, c, e, g) and berry ripening (b, d, f, h). Plants were cultivated under elevated (e[CO₂]) or actual (a[CO₂]) air CO₂. Values represent the mean \pm s.e. ($n = 8$). P -values for the effects of [CO₂] and diurnal periods ≤ 0.05 were considered significant and marked in bold. When different, lower case letters indicate differences between CO₂ levels. Upper case letters below the x-axis indicate significant differences between diurnal periods.