Supplementary to "Temperature response measurements from eucalypts give insight into the impact of Australian isoprene emissions on air quality in 2050" by K.M. Emmerson et al.

1 Condition of sapling eucalypt specimens.

The trees are ~1.5 m tall and have produced plenty of leaves prior to the experiment.

Figure S1 photograph of experimental set-up. Left *E. camaldulensis*, right *E tereticornis*

2 ESA to NCAR plant functional type classifications

Constructed for 2010, the ESA uses 36 land cover classes to describe global vegetation. These land cover classes have been processed to the NCAR plant functional types as required by MEGANv2.1 using similar methods as Emmerson et al. (2016). The ESA dataset also describes the percentage tree and shrub cover, so only minor estimation of tree/shrub/grass coverage is required (for example where the percentage of total trees is split between broadleaf evergreen and deciduous species). Any remaining ground is classed as bare soil and contains no vegetation. Table S1 gives the details of how each ESA land cover type has been split into the NCAR plant functional types (PFTs) as required by MEGAN.

Table S1. Relationship of ESA land cover types to NCAR PFTs, sorted according to boreal, temperate and tropical biomes. Not all land cover types are present in Australia.

ESA land cover type		**NCAR Plant Functional Types**		
		Boreal **≤-19 °C**	**Temperate** **-19 °C ≤ X ≤ 15.5 °C**	**Tropical** **≥15.5 °C**
0	No Data			
10	Cropland, rainfed	90% Crop 10% Corn	90% Crop 10% Corn Bt Eg T	90% Crop 10% Corn Bt Eg Tr
11	Herbaceous cover			
12	Tree or shrub cover			
20	Cropland, irrigated or post flooding			
30	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous	85% Crop	85% Crop 15% Sb Eg T Bt Eg T	85% Crop 15% Gs C3 W Bt Eg T
40	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%)		Sb Eg T 75% Bt Eg T 25% Bt Dc T	Gs C3 W 75% Bt Eg Tr 25% Bt Dc Tr
50	Tree cover, broadleaved, evergreen, closed to open (>15%)		Bt Eg T	Bt Eg Tr
60	Tree cover, broadleaved, deciduous, closed to open (>15%)	Bt Dc B	Bt Dc T	Bt Dc Tr
61	Tree cover, broadleaved, deciduous, closed (>40%)			
62	Tree cover, broadleaved, deciduous, open (15-40%)			
70	Tree cover, needleleaved, evergreen, closed to open (>15%)	Nt Eg B	Nt Eg T	

71	Tree cover, needleleaved, evergreen, closed (>40%)			
72	Tree cover, needleleaved, evergreen, open (15-40%)			
80	Tree cover, needleleaved, deciduous, closed to open (>15%)	Nt Dc B		
81	Tree cover, needleleaved, deciduous, closed (>40%)			
82	Tree cover, needleleaved, deciduous, open (15-40%)			
90	Tree cover, mixed leaf type (broadleaved and needleleaved)	50% Nt Dc B 50% Nt Eg B	33% Nt Eg B 33% Bt Eg T 33% Bt Dc T	50% Bt Eg Tr 50% Bt Dc Tr
100	Mosaic tree and shrub (>50%) / herbaceous cover (<50%)		Sb Eg T Bt Eg T	Gs C3 W Bt Eg Tr
110	Mosaic herbaceous cover (>50%) / tree and shrub (<50%)	Sb Dc B	Sb Dc T Sb Eg T	
120	Shrubland		34.5% Sb Eg T 34.5% Sb Dc T 25% Gs C3 Cl 50% Bt Eg T 50% Bt Dc T	25% Gs C3 W 50% Bt Eg Tr 50% Bt Dc Tr
121	Evergreen shrubland		Sb Eg T	
122	Deciduous shrubland		Sb Dc T	
130	Grassland	Gs C3 Cd	Gs C3 Cl 75% Bt Eg T 25% Bt Dc T	Gs C3 W 75% Bt Eg Tr 25% Bt Dc Tr
140	Lichens and mosses	-	-	-
150	Sparse vegetation (tree, shrub, herbaceous cover) (<15%)		10% Sb Eg T 10% Sb Dc T	
152	Sparse shrub (<15%)			

153	Sparse herbaceous cover (<15%)		80% Gs C3 Cl Bt Eg T	Gs C3 W Bt Eg Tr
160	Tree cover, flooded, fresh or brackish water		Bt Eg T	Bt Eg Tr
170	Tree cover, flooded, saline water		Bt Eg T	Bt Eg Tr
180	Shrub or herbaceous cover, flooded, fresh/saline/brackish water		Sb Eg T	
190	Urban areas		Sb Eg T Gs C3 Cl 50% Bt Eg T 50% Bt Dc T	 Gs C3 W 50% Bt Eg Tr 50% Bt Dc Tr
200	Bare areas	-	-	-
201	Consolidated bare areas	-	-	-
202	Unconsolidated bare areas	-	-	-
210	Water bodies	-	-	-
220	Permanent snow and ice	-	-	-

Notes: B = Boreal, T = Temperate, Tr = Tropical.

Nt Eg = needleleaf evergreen tree, Nt Dc = needleleaf deciduous tree, Bt Eg = broadleaf evergreen tree, Bt Dc = broadleaf deciduous tree, Sb Eg = evergreen shrub, Sb Dc = deciduous shrub, Gs C3 = grass (can be Cd = cold, Cl = cool or W = warm depending on climatic zone).

3 Climate models used for 2050 temperature projections.

Surface temperature data for eight models considered in the Climate Model Intercomparison Project CMIP5 were downloaded for Australia. https://www.climatechangeinaustralia.gov.au/en/climate-projections/explore-data/map-explorer/

The eight models are: CanESM2, CNRM-CM5, ACCESS1.0, MIROC5, HadGEM2-CC, NorESM1-M, GFDL-ESM2M and CESM1-CAM5. The models were chosen to represent a wide range in climate projections and were judged to have performed well against 20th century observations.

The period December to February was chosen to correspond with the summer field campaigns used in this work. The change in seasonal temperature is calculated compared to the seasonal average between 1986 and 2005.

A range in warming is predicted by the eight models, with maximums ranging between 1.74°C and 3.83°C. For the purposes of this study, an average change in temperature was calculated from the ensemble. These delta temperatures were re-gridded to suit the four domains used by the C-CTM.