

1 Supplementary material

2 Table S1

3 Complete list of ‘constitutive’ (‘c’) and ‘stress-induced’ (‘s’) BVOCs, sorted by groups (MT =
4 monoterpenes; SQT = sesquiterpenes; BZ = benzenoids; GLV = green leaf volatiles).

BVOC	Group	Class
Isoprene	Isoprene	c
α -pinene	cMT	c
α -thujene	cMT	c
Camphene	cMT	c
Sabinene	cMT	c
β -pinene	cMT	c
δ -3-carene	cMT	c
γ -terpinene	cMT	c
Limonene	cMT	c
Terpinolene	cMT	c
β -ocimene	sMT	s
β -myrcene	sMT	s
Linalool	sMT	s
Eucalyptol	sMT	s
α -cadinol	SQT	s
α -copaene	SQT	s
α -cubebene	SQT	s
α -farnesene	SQT	s
α -ylangene	SQT	s
β -bourbonene	SQT	s
γ -muurolene	SQT	s
α -cedrol	SQT	s
(E,E)-farnesol	SQT	s
Calarene	SQT	s
Geranyl acetone	SQT	s
β -(E)-Caryophyllene	SQT	s
Cis-caryophyllene	SQT	s
Isolongifolene	SQT	s
Junipene	SQT	s
Benzaldehyde	BZ	s
Benzeneacetaldehyde	BZ	s
Benzyl alcohol	BZ	s
Methyl benzoate	BZ	s
Benzyl benzoate	BZ	s
Methyl Salicylate	BZ	s
Phenol, o-methoxy-	BZ	s
Phenol, 2-methoxy-4-(2-propenyl)	BZ	s
(Z)-3-hexenol	GLV	s
(Z)-3-hexenylacetate	GLV	s

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Table S2

Net assimilation rates under of leaf enclosed measurements under standard steady-state conditions (leaf temperature 30°C, incident PPFD of 1,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$, and CO_2 concentration of 380 $\mu\text{mol mol}^{-1}$). Means of 3 trees \pm s.e.

Plant type	Abr.	Latin name	English name	A [$\mu\text{mol m}^{-2} \text{s}^{-1}$]
Trees	<i>Fv</i>	<i>Fraxinus velutina</i> Torr.	Velvet Ash	3.8 \pm 1.8
	<i>Md</i>	<i>Magnolia denudata</i> Desr.	Yulan Magnolia	2.7 \pm 0.7
	<i>Pp</i>	<i>Prunus persica</i> cv. Duplex	Flowering Peach	11.0 \pm 1.6
	<i>Aa</i>	<i>Ailanthus altissima</i> (Mill.) Swingle	Tree of Heaven	3.3 \pm 0.6
	<i>Sb</i>	<i>Salix babylonica</i> L.	Weeping Willow	7.7 \pm 0.9
	<i>Sj</i>	<i>Sophora japonica</i> L.	Japanese Pagoda Tree	7.4 \pm 0.6
	<i>Ms</i>	<i>Malus spectabilis</i> (Ait) Borkh.	Chinese Flowering Crabapple	5.7 \pm 2.5
	<i>Kp</i>	<i>Koelreuteria paniculata</i> Laxm.	Golden Rain Tree	3.6 \pm 0.4
	<i>Lc</i>	<i>Liriodendron chinense</i> x tulipikera	Chinese Tulip Tree	4.5 \pm 1.8
	<i>Pt</i>	<i>Populus tomentosa</i> Carr.	Chinese White Poplar	9.5 \pm 1.6
	<i>Cb</i>	<i>Catalpa bungei</i> C.A.Mey.	Manchurian Catalpa	6.2 \pm 1.4
	<i>Dk</i>	<i>Diospyros kaki</i> L.f.	Japanese Persimmon	3.0 \pm 0.7
	<i>Pa</i>	<i>Platanus</i> \times <i>acerifolia</i> (Ait) Willd.	London Plane	8.0 \pm 1.8
	<i>Gb</i>	<i>Ginkgo biloba</i> L.	Maidenhair Tree	4.8 \pm 0.6
Shrubs	<i>Up</i>	<i>Ulmus pumila</i> L.	Siberian Elm	9.0 \pm 1.3
	<i>Pc</i>	<i>Prunus cerasifera</i> Ehrh.	Pissard Plum	3.7 \pm 0.3
	<i>Ej</i>	<i>Euonymus japonicus</i> Thunb.	Evergreen Euonymus	6.0 \pm 0.4
	<i>Sp</i>	<i>Syringa pekinensis</i> Rupr.	Broad-leaved Lilac	7.1 \pm 2.1
	<i>Lm</i>	<i>Lonicera maackii</i> (Rupr.) Maxim.	Amur Honeysuckle	2.5 \pm 0.4
	<i>Fs</i>	<i>Forsythia suspensa</i> (Thunb.) Vahl	Weeping Forsythia	5.9 \pm 1.7
	<i>Lq</i>	<i>Ligustrum quihoui</i> Carr.	Wax Leaf Privet	6.8 \pm 1.0
	<i>Bt</i>	<i>Berberis thunbergii</i> DC.	Japanese Barberry	9.0 \pm 1.0

1 **Table S3**

2 Source strengths (Q) for secondary organic particulate matter originating from biogenic VOC
 3 (BVOC) and atmospheric concentrations (C) expectable at 2 km height of the planetary
 4 boundary layer.

BVOC group	BVOC class	Yield	Q (2005) $\text{g m}^{-3} \text{s}^{-1}$	C (2005) $\mu\text{g m}^{-3}$	Q (2010) $\text{g m}^{-3} \text{s}^{-1}$	C(2010) $\mu\text{g m}^{-3}$
Isoprene	c	0.02	$9.9 \cdot 10^{-13}$	0.34	$1.9 \cdot 10^{-12}$	0.66
cMT	c	0.06	$8.8 \cdot 10^{-13}$	0.30	$1.8 \cdot 10^{-12}$	0.61
sMT	s	0.06	$4.0 \cdot 10^{-15}$	0.0014	$8.1 \cdot 10^{-15}$	0.0028
SQT+BZ	s	0.22	$1.2 \cdot 10^{-12}$	0.41	$2.3 \cdot 10^{-12}$	0.78
Sum	c+s			1.05		2.05

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1 **Table S4**

2 Source strengths (Q) for secondary organic particulate matter originating from anthropogenic
 3 VOC (AVOC) and atmospheric concentrations (C) expectable at 2 km height of the planetary
 4 boundary layer.

AVOC group	Yield	Q (2005) $\text{g m}^{-3} \text{s}^{-1}$	C (2005) $\mu\text{g m}^{-3}$	Q (2010) $\text{g m}^{-3} \text{s}^{-1}$	C(2010) $\mu\text{g m}^{-3}$
Benzene	0.14	$6.2 \cdot 10^{-12}$	2.1	$3.8 \cdot 10^{-12}$	1.3
Toluene	0.14	$5.6 \cdot 10^{-11}$	19	$4.0 \cdot 10^{-11}$	13
Xylenes	0.14	$1.0 \cdot 10^{-10}$	36	$8.7 \cdot 10^{-11}$	30
Sum		$1.62 \cdot 10^{-10}$	57.1	$1.3 \cdot 10^{-10}$	44.3

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1 **Table S5 (see excel file attached)**

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3 **Table S6**

4 Specification of the trees measured. Abbreviation follows Table 1. * = potted plants.

Abr.	Age (years)	Height (m)
<i>Sj</i>	25	6
<i>Gb</i>	20	8
<i>Ej</i>	12	1
<i>Ms</i>	13	5
<i>Lc</i>	10	8
<i>Cb</i>	14	9
<i>Lq</i>	12	0.6
<i>Bt</i>	13	1
<i>Kp</i>	20	7
<i>Pp</i>	10	4
<i>Aa</i>	15	12
<i>Sp</i>	10	2
<i>Fv</i>	18	12
<i>Fs</i>	12	2
<i>Pt*</i>	2	2.4
<i>Sb*</i>	2	1.1
<i>Pc</i>	9	5
<i>Lm</i>	8	3
<i>Dk</i>	20	6
<i>Up</i>	13	7
<i>Md</i>	15	4
<i>Pa</i>	10	4

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1 Table S7

- 2 Input and output data for the generation of the phylogenetic tree using the web tool iTOL
- 3 (<http://itol.embl.de/>) (Letunic and Bork, 2006, 2011).

Input data: Taxonomic data
<p> Populus_tomentosa Prunus_persica Catalpa_bungei Fraxinus_velutina Diospyros_kaki Liriodendron_chinense Prunus_cerasifera Malus_spectabilis Platanus_acerifolia Ailanthus_altissima Sophora_japonica Ginkgo_biloba Forsythia_suspensa Ligustrum_quihoui Berberis_thunbergii Koelreuteria_paniculata Magnolia_denudata Lonicera_maackii Ulmus_pumila Euonymus_japonicus Syringa_pekinesis Salix_babylonica </p>
Output data: Phylogenetic tree with internal nodes
<p> ((((((((((((Liriodendron_chinense)Liriodendron,(Magnolia_denudata)Magnolia)Magnoliaceae)Magnolia les)Magnoliidae,((((Berberis_thunbergii)Berberis)Berberidoideae)Berberidaceae)Ranunculales,(((Platanu s_acerifolia)Platanus)Platanaceae)Proteales)stem_eudicotyledons,((((Lonicera_maackii)Lonicera)Caprif oliaceae)Dipsacales)campanulids,(((Diospyros_kaki)Diospyros)Ebenaceae)Ericales,((((Catalpa_bungei)Ca talpa)Catalpeae)Bignoniaceae,(((Ligustrum_quihoui)Ligustrum,(Syringa_pekinesis)Syringa,(Fraxinus_vel utina)Fraxinus)Oleeae,((Forsythia_suspensa)Forsythia)Forsythieae)Oleaceae)Lamiales)lamiids)asterids,(((((Populus_tomentosa)Populus,(Salix_babylonica)Salix)Saliceae)Salicaceae)Malpighiales,(((Euonymus_jap onicus)Euonymus)Celastraceae)Celastrales,((((Sophora_japonica)Sophora)Sophoreae)Papilionoideae)Fab aceae)Fabales,((((Malus_spectabilis)Malus)Maleae,((Prunus_cerasifera,Prunus_persica)Prunus)Amygdale ae)Maloideae)Rosaceae,((Ulmus_pumila)Ulmus)Ulmaceae)Rosales)fabids,(((Koelreuteria_paniculata)Koe lreuteria)Sapindaceae,((Ailanthus_altissima)Ailanthus)Simaroubaceae)Sapindales)malvids)rosids)Pentapet alae)Gunneridae)eudicotyledons)Mesangiospermae)Magnoliophyta,((((Ginkgo_biloba)Ginkgo)Ginkgoace ae)Ginkgoales)Ginkgoideae)Acrogymnospermae)Spermatophyta)Euphyllophyta)Tracheophyta)Embryophyt a)Streptophytina)Streptophyta)Viridiplantae)Eukaryota)cellular_organisms); </p>

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Table. S8 (see excel file attached)

Fig. S1

Daily BVOC emission estimates of (A) ‘stress-induced’ BVOCs (sBVOC), ‘constitutive’ (B) monoterpenes (MT) and (C) isoprene using the tree inventory of 2005 (in black lines) and 2010 (grey dash lines) and using the SIM model (see material and method).

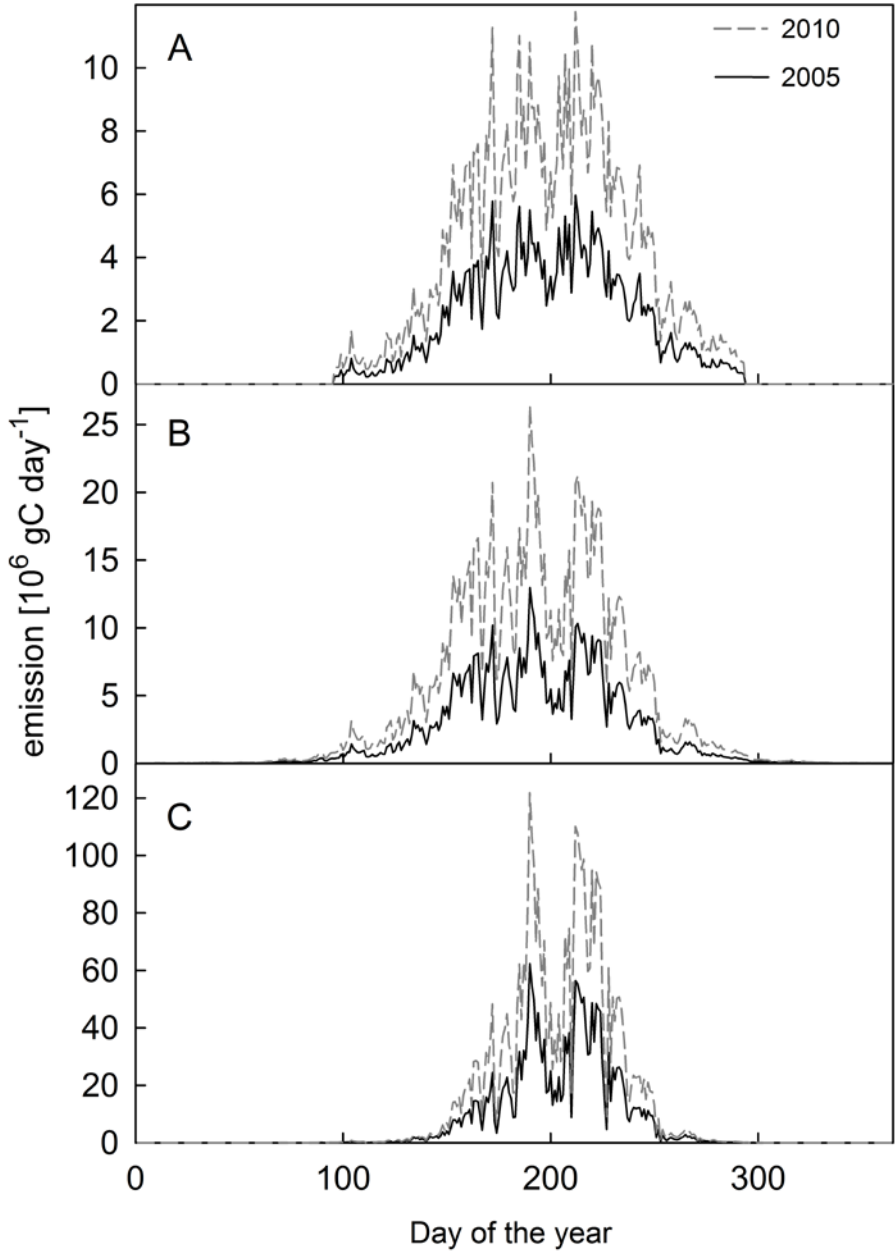


Fig. S2

(**A**) Relative leaf area index (LAI) and (**B**) emission activities simulated for deciduous species (in black lines) and evergreen (dash lines) and measured in dominant tree species.

