Supplement of

Evaluation of improved land use and canopy representation in BEIS v3.61 with biogenic VOC measurements in California

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8 Supplementary Figures

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10 Figure S1. Schematic of the data inputs and processing steps used to create and evaluate the Biogenic
11 Emissions Landuse Dataset (BELD) version 4.

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13 Figure S2. Vegetation fraction for aggregated oak and needle leaf vegetation from BELD3 (left) and
 14 BELD4 (right). Field study locations shown with red circles.

Figure S3. Modeled and measured isoprene, methacrolein+methyl vinyl ketones, and MPAN at Blodgett Forest.

19 **Supplementary Table**

20 Table S1. FIA to BELD4 mapping scheme.

FIA.Name	BELD.Name	BEIS.BM
Abies.amabilis	Fir_Pacf_silver	1500
Abies.balsamea	Fir_balsam	1500
Abies.bracteata	Fir_SantaLucia	1500
Abies.concolor	Fir_white	1500
Abies.fraseri	Fir_fraser	1500
Abies.grandis	Fir_grand	1500
Abies.lasiocarpa	Fir_corkbark	1500
Abies.magnifica	Fir_CA_red	1500
Abies.procera	Fir_noble	1500
Abies.shastensis	Fir_Shasta_red	1500
Abies.spp.	Fir_spp	1500
Acacia.farnesiana	Acacia	700
Acer.barbatum	Maple_FL	375
Acer.glabrum	Maple_RkyMtn	375
Acer.grandidentatum	Maple_bigleaf	375
Acer.leucoderme	Maple_spp	375
Acer.macrophyllum	Maple_bigtooth	375
Acer.negundo	Maple_boxelder	375
Acer.nigrum	Maple_black	375
Acer.pensylvanicum	Maple_stripped	375
Acer.platanoides	Maple_Norway	375
Acer.rubrum	Maple_red	375
Acer.saccharinum	Maple_silver	375
Acer.saccharum	Maple_sugar	375
Acer.spicatum	Maple_mtn	375
Acer.spp.	Maple_spp	375
Aesculus.californica	Chestnut_buckeye	375
Aesculus.flava	Chestnut_buckeye	375
Aesculus.glabra	Chestnut_buckeye	375
Aesculus.glabra	Chestnut_buckeye	375
Aesculus.pavia	Chestnut_buckeye	375
Aesculus.spp.	Chestnut_buckeye	375
Aesculus.sylvatica	Chestnut_buckeye	375
Ailanthus.altissima	Ailanthus	375
Albizia.julibrissin	Spruce_spp	1500
Alnus.glutinosa	Alder	375
Alnus.oblongifolia	Alder	375
Alnus.rhombifolia	Alder	375
Alnus.rubra	Alder	375

Amelanchier.arborea	Serviceberry	375
Amelanchier.sanguinea	Serviceberry	375
Amelanchier.spp.	Serviceberry	375
Annona.glabra	Misc-hardwoods	375
Arbutus.arizonica	Madrone	375
Arbutus.menziesii	Madrone	375
Arbutus.xalapensis	Madrone	375
Asimina.triloba	Pawpaw	375
Avicennia.germinans	Misc-hardwoods	375
Betula.alleghaniensis	Birch	375
Betula.lenta	Birch	375
Betula.nigra	Birch	375
Betula occidentalis	Birch	375
Betula.papyrifera	Birch	375
Betula.populifolia	Birch	375
Betula.spp.	Birch	375
Bursera.simaruba	Oak_spp	375
Calocedrus.decurrens	Incense_cedar	1500
Carpinus.caroliniana	Hornbeam	375
Carya.alba	Hickory	375
Carya.aquatica	Hickory	375
Carya.carolinae.septentrionalis	Hickory	375
Carya.cordiformis	Hickory	375
Carya.glabra	Hickory	375
Carya.illinoensis	Hickory	375
Carya.laciniosa	Hickory	375
Carya.myristiciformis	Hickory	375
Carya.ovalis	Hickory	375
Carya.ovata	Hickory	375
Carya.pallida	Hickory	375
Carya.spp.	Hickory	375
Carya.texana	Hickory	375
Castanea.dentata	Castanea	375
Castanea.mollissima	Castanea	375
Castanea.pumila	Castanea	375
Castanea.pumila	Castanea	375
Castanea.spp.	Castanea	375
Casuarina.lepidophloia	Oak_spp	375
Catalpa.bignonioides	Catalpa	375
Catalpa.speciosa	Catalpa	375
Catalpa.spp.	Catalpa	375
Celtis.laevigata	Hackberry	375
Celtis.occidentalis	Hackberry	375

Celtis.spp.	Hackberry	375
Cercis.canadensis	Redbay	375
Cercocarpus.ledifolius	Mahogany	375
Chamaecyparis.lawsoniana	Cedar_chamaecyp	1500
Chamaecyparis.nootkatensis	Cedar_chamaecyp	1500
Chamaecyparis.thyoides	Cedar_chamaecyp	1500
Chrysolepis.chrysophylla	Misc-hardwoods	375
Cinnamomum.camphora	Misc-hardwoods	375
Citrus.spp.	Misc-hardwoods	375
Cladrastis.kentukea	Yellowwood	375
Coccoloba.diversifolia	Misc-hardwoods	375
Coccothrinax.argentata	Misc-hardwoods	375
Condalia.hookeri	Spruce_spp	1500
Conocarpus.erectus	Misc-hardwoods	375
Cordia.sebestena	Misc-hardwoods	375
Cornus.florida	Dogwood	375
Cornus.nuttallii	Dogwood	375
Cotinus.obovatus	Smoketree	375
Crataegus.crus.galli	Hawthorn	375
Crataegus.mollis	Hawthorn	375
Crataegus.spp.	Hawthorn	375
Cupressus.arizonica	Cypress_cupress	375
Cupressus.bakeri	Cypress_cupress	375
Cupressus.macrocarpa	Cypress_cupress	375
Cupressus.sargentii	Cypress_cupress	375
Cupressus.spp.	Cypress_cupress	375
Diospyros.spp.	Persimmon	375
Diospyros.texana	Persimmon	375
Diospyros.virginiana	Persimmon	375
Ebenopsis.ebano	Misc-hardwoods	375
Ehretia.anacua	Misc-hardwoods	375
Elaeagnus.angustifolia	Misc-hardwoods	375
Eucalyptus.globulus	Eucalyptus	375
Eucalyptus.grandis	Eucalyptus	375
Eucalyptus.spp.	Eucalyptus	375
Fagus.grandifolia	Beech	375
Family.Areaceae.not.listed.above	Misc-hardwoods	375
Ficus.aurea	Spruce_spp	1500
Fraxinus.americana	Ash	375
Fraxinus.caroliniana	Ash	375
Fraxinus.latifolia	Ash	375
Fraxinus.nigra	Ash	375
Fraxinus.pennsylvanica	Ash	375

Fraxinus.profunda	Ash	375
Fraxinus.quadrangulata	Ash	375
Fraxinus.spp.	Ash	375
Fraxinus.texensis	Ash	375
Fraxinus.velutina	Ash	375
Ginkgo.biloba	Misc-hardwoods	375
Gleditsia.aquatica	Gleditsia_locust	375
Gleditsia.spp.	Gleditsia_locust	375
Gleditsia.triacanthos	Gleditsia_locust	375
Gordonia.lasianthus	Loblolly_bay	375
Guapira.discolor	Misc-hardwoods	375
Gymnocladus.dioicus	KY_coffeetree	375
Halesia.carolina	Silverbell	375
Halesia.diptera	Silverbell	375
Halesia.spp.	Silverbell	375
Ilex.opaca	Holly_American	375
Juglans.californica	Walnut	375
Juglans.cinerea	Walnut	375
Juglans.hindsii	Walnut	375
Juglans.major	Walnut	375
Juglans.microcarpa	Walnut	375
Juglans.nigra	Walnut	375
Juglans.spp.	Walnut	375
Juniperus.ashei	Juniper	700
Juniperus.californica	Juniper	700
Juniperus.coahuilensis	Juniper	700
Juniperus.deppeana	Juniper	700
Juniperus.flaccida	Juniper	700
Juniperus.monosperma	Juniper	700
Juniperus.occidentalis	Juniper	700
Juniperus.osteosperma	Juniper	700
Juniperus.pinchotii	Juniper	700
Juniperus.scopulorum	Juniper	700
Juniperus.spp.	Juniper	700
Juniperus.virginiana	Juniper	700
Laguncularia.racemosa	Misc-hardwoods	375
Larix.laricina	Larch	375
Larix.lyallii	Larch	375
Larix.occidentalis	Larch	375
Larix.spp.	Larch	375
Leucaena.pulverulenta	Misc-hardwoods	375
Liquidambar.styraciflua	Sweetgum	375
Liriodendron.tulipifera	Yellow_poplar	375

Lithocarpus.densiflorus	Tanoak	375
Maclura.pomifera	Osage-orange	375
Magnolia.acuminata	Magnolia	375
Magnolia.fraseri	Magnolia	375
Magnolia.grandiflora	Magnolia	375
Magnolia.macrophylla	Magnolia	375
Magnolia.spp.	Magnolia	375
Magnolia.tripetala	Magnolia	375
Magnolia.virginiana	Magnolia	375
Malus.angustifolia	Apple	375
Malus.coronaria	Apple	375
Malus.fusca	Apple	375
Malus.ioensis	Apple	375
Malus.spp.	Apple	375
Melaleuca.quinquenervia	Cajeput	375
Melia.azedarach	Chinaberry	375
Metopium.toxiferum	Misc-hardwoods	375
Morus.alba	Mulberry	375
Morus.microphylla	Mulberry	375
Morus.rubra	Mulberry	375
Morus.spp.	Mulberry	375
Nyssa.aquatica	Nyssa	375
Nyssa.biflora	Nyssa	375
Nyssa.ogeche	Nyssa	375
Nyssa.sylvatica	Nyssa	375
Olneya.tesota	Robinia_locust	375
Ostrya.virginiana	East_hophornbean	375
Oxydendrum.arboreum	Sourwood	375
Paulownia.tomentosa	Paulownia	375
Persea.borbonia	Misc-hardwoods	375
Eugenia.rhombea	Misc-hardwoods	375
Persea.spp.	Misc-hardwoods	375
Picea.abies	Spruce_Norway	1500
Picea.breweriana	Spruce_Brewer	1500
Picea.engelmannii	Spruce_Engelmann	1500
Picea.glauca	Spruce_white	1500
Picea.mariana	Spruce_black	1500
Picea.pungens	Spruce_blue	1500
Picea.rubens	Spruce_red	1500
Picea.sitchensis	Spruce_Sitka	1500
Picea.spp.	Spruce_spp	1500
Pinus.albicaulis	Pine_whitebark	700
Pinus.aristata	Pine_brstlcone	700

Pinus.arizonica	Pine_AZ	700
Pinus.attenuata	Pine_knobcone	700
Pinus.balfouriana	Pine_foxtail	700
Pinus.banksiana	Pine_jack	700
Pinus.cembroides	Pine_pinyon	700
Pinus.clausia	Pine_sand	700
Pinus.contorta	Pine_lodgepole	700
Pinus.coulteri	Pine_Coulter	700
Pinus.discolor	Pine_pinyon_brdr	700
Pinus.echinata	Pine_shortleaf	700
Pinus.edulis	Pine_pinyon_cmn	700
Pinus.elliottii	Pine_slash	700
Pinus.engelmannii	Pine_Apache	700
Pinus.flexilis	Pine_limber	700
Pinus.glabra	Pine_spruce	700
Pinus.jeffreyi	Pine_Jeffrey	700
Pinus.lambertiana	Pine_sugar	700
Pinus.leiophylla	Pine_chihuahua	700
Pinus.longaeva	Pine_brstlccone	700
Pinus.monophylla	Pine_pinyon	700
Pinus.monticola	Pine_Wwhite	700
Pinus.muricata	Pine_Bishop	700
Pinus.nigra	Pine_Austrian	700
Pinus.palustris	Pine_longleaf	700
Pinus.ponderosa	Pine_ponderosa	700
Pinus.pungens	Pine_tablemtn	700
Pinus.radiata	Pine_Monterey	700
Pinus.remota	Pine_pinyon	700
Pinus.resinosa	Pine_red	700
Pinus.rigida	Pine_pitch	700
Pinus.sabiniana	Pine_digger	700
Pinus.serotina	Pine_pond	700
Pinus.spp.	Pine_pinyon	700
Pinus.strobiformis	Pine_Swwhite	700
Pinus.strobus	Pine_Ewhite	700
Pinus.sylvestris	Pine_scotch	700
Pinus.taeda	Pine_loblolly	700
Pinus.virginiana	Pine_VA	700
Pinus.washoensis	Pine_Washoe	700
Piscidia.piscipula	Misc-hardwoods	375
Planera.aquatica	Water-elm	375
Platanus.occidentalis	Sycamore	375
Platanus.racemosa	Sycamore	375

Platanus.spp.	Sycamore	375
Platanus.wrightii	Sycamore	375
Populus.alba	Populus	375
Populus.angustifolia	Populus	375
Populus.balsamifera	Populus	375
Populus.deltoides	Populus	375
Populus.fremontii	Populus	375
Populus.grandidentata	Populus	375
Populus.heterophylla	Populus	375
Populus.nigra	Populus	375
Populus.spp.	Populus	375
Populus.tremuloides	Populus	375
Prosopis.glandulosa	Mesquite	375
Prosopis.pubescens	Mesquite	375
Prosopis.spp.	Mesquite	375
Prosopis.velutina	Mesquite	375
Prunus.americana	Prunus	375
Prunus.avium	Prunus	375
Prunus.cerasus	Prunus	375
Prunus.emarginata	Prunus	375
Prunus.nigra	Prunus	375
Prunus.pensylvanica	Prunus	375
Prunus.persica	Prunus	375
Prunus.serotina	Prunus	375
Prunus.spp.	Prunus	375
Prunus.virginiana	Prunus	375
Pseudotsuga.macrocarpa	Douglas_fir	1500
Pseudotsuga.menziesii	Douglas_fir	1500
Quercus.agrifolia	Oak_CA_live	375
Quercus.alba	Oak_white	375
Quercus.arizonica	Oak_AZ_white	375
Quercus.bicolor	Oak_swamp_white	375
Quercus.buckleyi	Oak_spp	375
Quercus.chrysolepis	Oak_canyon_live	375
Quercus.coccinea	Oak_scarlet	375
Quercus.douglasii	Oak_blue	375
Quercus.ellipsoidalis	Oak_Northrn_pin	375
Quercus.emoryi	Oak_Emercy	375
Quercus.engelmannii	Oak_Engelmann	375
Quercus.falcata	Oak_Southrn_red	375
Quercus.gambelii	Oak_Gambel	375
Quercus.garryana	Oak_OR_white	375
Quercus.graciliformis	Oak_spp	375

Quercus.gravesii	Oak_spp	375
Quercus.grisea	Oak_spp	375
Quercus.hypoleucoides	Oak_silverleaf	375
Quercus.ilicifolia	Oak_bear	375
Quercus.imbricaria	Oak_shingle	375
Quercus.incana	Oak_bluejack	375
Quercus.kelloggii	Oak_CA_black	375
Quercus.laceyi	Oak_spp	375
Quercus.laevis	Oak_turkey	375
Quercus.laurifolia	Oak_laurel	375
Quercus.lobata	Oak_CA_white	375
Quercus.lyrata	Oak_overcup	375
Quercus.macrocarpa	Oak_bur	375
Quercus.margarettae	Oak_spp	375
Quercus.marilandica	Oak_blackjack	375
Quercus.michauxii	Oak_swamp_cnut	375
Quercus.minima	Oak_spp	375
Quercus.muehlenbergii	Oak_chinkapin	375
Quercus.nigra	Oak_water	375
Quercus.oblongifolia	Oak_Mexicanblue	375
Quercus.oglethorpensis	Oak_spp	375
Quercus.pagoda	Oak_spp	375
Quercus.palustris	Oak_pin	375
Quercus.phellos	Oak_willow	375
Quercus.prinoides	Oak_spp	375
Quercus.prinus	Oak_chestnut	375
Quercus.rubra	Oak_Northrn_red	375
Quercus.rugosa	Oak_spp	375
Quercus.shumardii	Oak_Shumrd_red	375
Quercus.similis	Oak_spp	375
Quercus.sinuata	Oak_Durand	375
Quercus.spp.	Oak_spp	375
Quercus.stellata	Oak_post	375
Quercus.texana	Oak_nuttall	375
Quercus.velutina	Oak_black	375
Quercus.virginiana	Oak_live	375
Quercus.wislizeni	Oak_interio_live	375
Rhizophora.mangle	Misc-hardwoods	375
Robinia.pseudoacacia	Robinia_locust	375
Roystonea.spp.	Misc-hardwoods	375
Sabal.palmetto	Misc-hardwoods	375
Salix.alba	Willow	375
Salix.amygdaloides	Willow	375

Salix.bebbiana	Willow	375
Salix.caroliniana	Willow	375
Salix.nigra	Willow	375
Salix.pyrifolia	Willow	375
Salix.sepulcralis	Willow	375
Salix.spp.	Willow	375
Sapindus.saponaria	Soapberry_westrn	375
Sassafras.albidum	Sassafras	375
Sequoia.sempervirens	Sequoia	1500
Sequoiadendron.giganteum	Sequoia	1500
Sideroxylon.lanuginosum	Bumelia_gum	375
Sideroxylon.salicifolium	Bumelia_gum	375
Sophora.affinis	Robinia_locust	375
Sorbus.americana	Mountain_ash	375
Sorbus.aucuparia	Mountain_ash	375
Sorbus.decora	Mountain_ash	375
Sorbus.spp.	Mountain_ash	375
Swietenia.mahagoni	Misc-hardwoods	375
Syzygium.cumini	Misc-hardwoods	375
Tamarix.spp.	Tamarix	375
Taxodium.ascendens	Cypress_taxodium	375
Taxodium.distichum	Cypress_taxodium	375
Taxus.brevifolia	Misc-hardwoods	375
Thrinax.morrisii	Willow	375
Thuja.occidentalis	Cedar_thuja	1500
Thuja.plicata	Cedar_thuja	1500
Tilia.americana	Basswood	375
Tilia.spp.	Basswood	375
Torreya.californica	Torreya	375
Tree.broadleaf	Misc-hardwoods	375
Tree.evergreen	Mixed_conifer_sp	700
Tree.unknown	Misc-hardwoods	375
Triadica.sebifera	Tallowtree-chins	375
Tsuga.canadensis	Hemlock	700
Tsuga.caroliniana	Hemlock	700
Tsuga.heterophylla	Hemlock	700
Tsuga.mertensiana	Hemlock	700
Tsuga.spp.	Hemlock	700
Ulmus.alata	Elm	375
Ulmus.americana	Elm	375
Ulmus.crassifolia	Elm	375
Ulmus.pumila	Elm	375
Ulmus.rubra	Elm	375

	Ulmus.serotina	Elm	375
	Ulmus.spp.	Elm	375
	Ulmus.thomasii	Elm	375
	Umbellularia.californica	Califor-laurel	375
	Vernicia.fordii	Tung-oil-tree	375
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