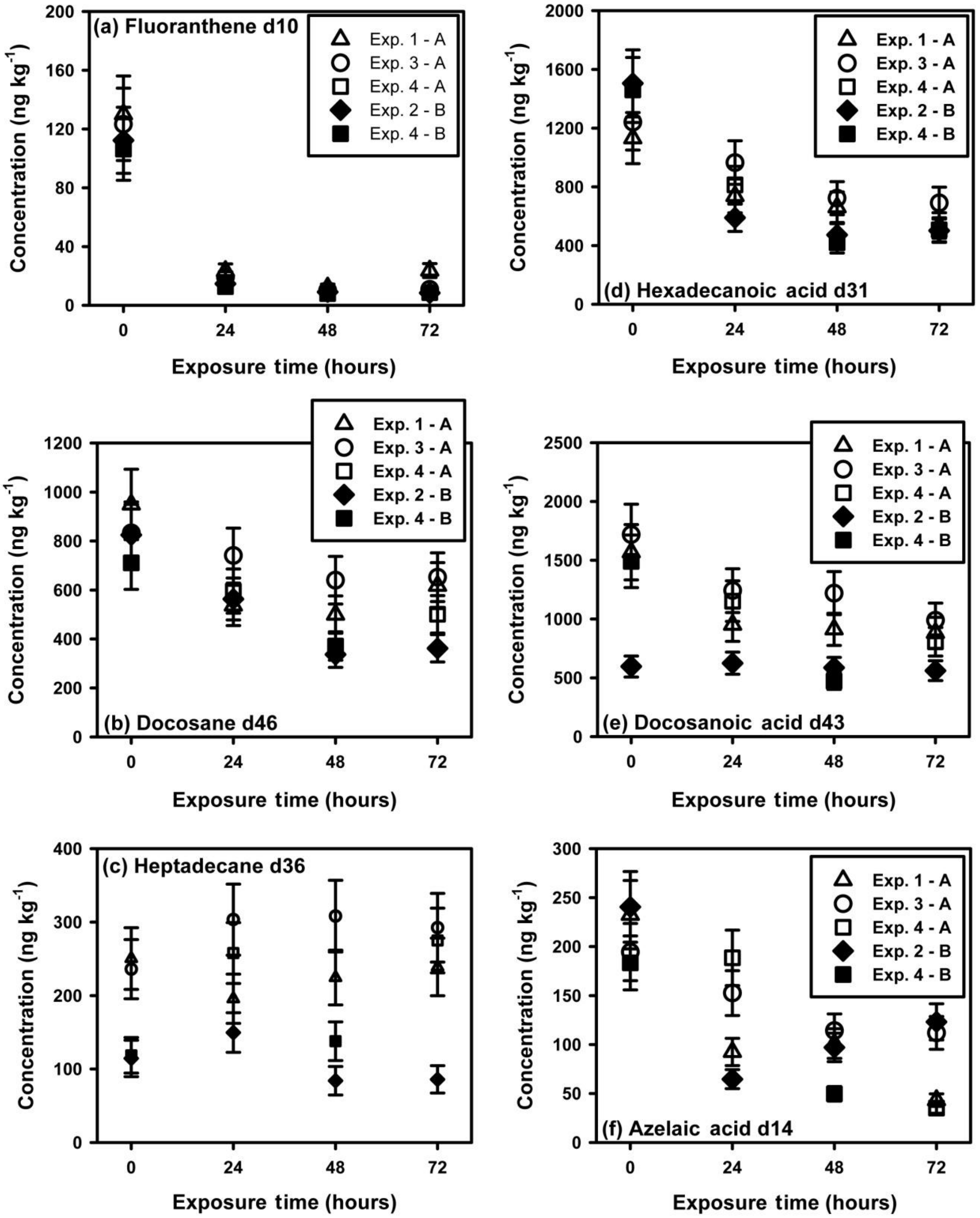
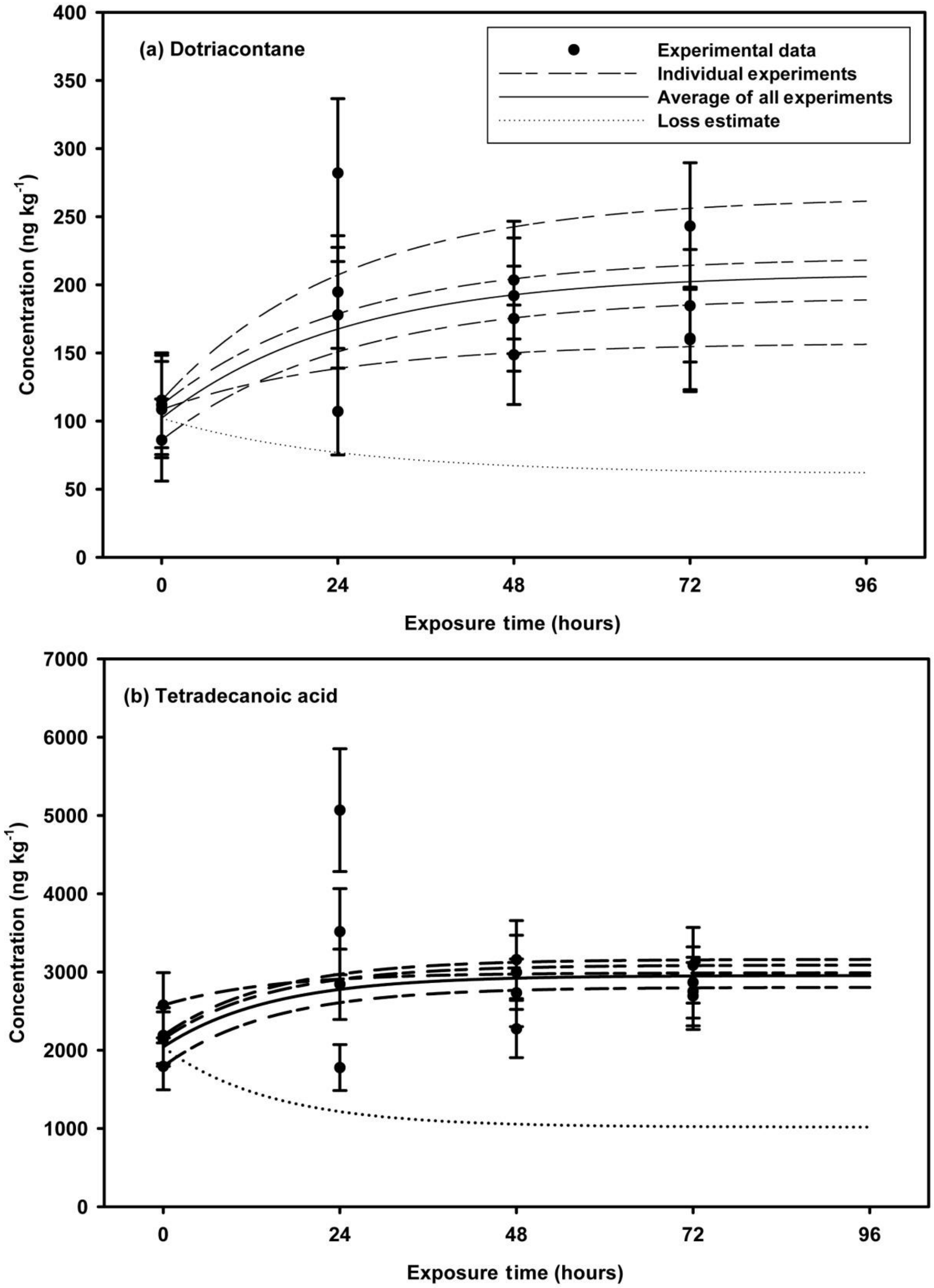
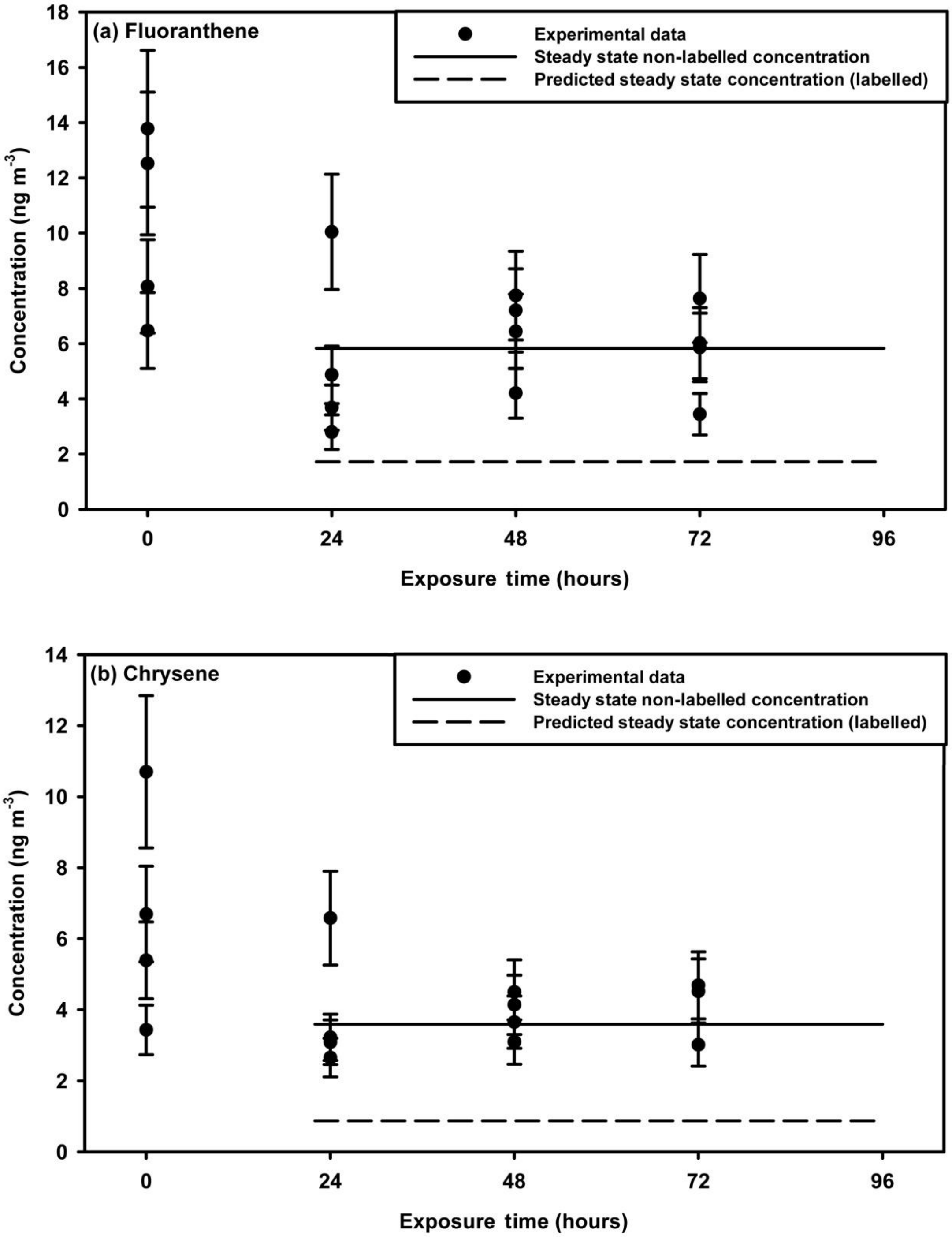
Supplementary figures and table for: von Schneidemesser E., Schauer J.J., Shafer M.M. & Bergin M.H. 2012. Measurement of loss rates of organic compounds in snow using in-situ experiments and isotopically labelled compounds. *Polar Research 31*. Correspondence: James J. Schauer, Environmental Chemistry and Technology Program, University of Wisconsin-Madison, 660 North Park Street, Madison, WI, 53706, USA. E-mail jjschauer@wisc.edu



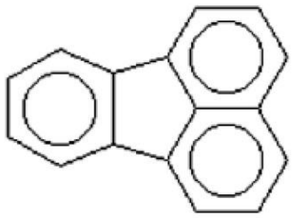
Supplementary Fig. S1. Concentration versus exposure time for the isotopically labelled compounds. Experiments are distinguished by symbols, batches by whether the symbols are open or filled. Error bars represent the standard deviation of the blank values for the compound class as well as a percentage of the initial sample value



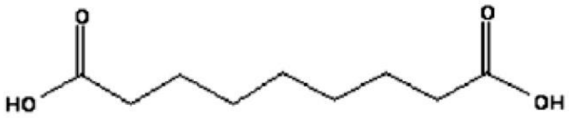
Supplementary Fig. S2. Concentration versus exposure time for the four experimental data sets for one of the n-alkanes and one of the n-alkanoic acids. The symbols represent the individual experimental data. The dotted line represents the degradation of the compound as determined from the corresponding isotopically labelled compound; the dashed lines are deposition curves (with the flux component) for each of the four experiments; the solid line is the average deposition curve for all of the experiments.



Supplementary Fig. S3. Concentration versus exposure time for the four experimental data sets for non-labeled fluoranthene and chrysene. The symbols represent the individual experimental data. The dashed line represents the predicted concentration of the compounds if affected only by loss processes similar to that of the labeled PAH. The solid line is the average steady state concentration from the measured values for the non-labeled compound from the 24, 48, and 72 hour data points from all experiments.



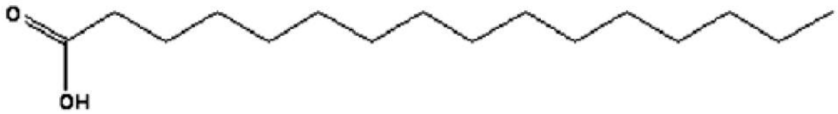
(a) Fluoranthene



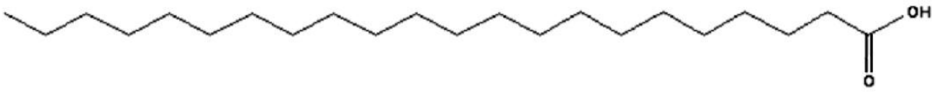
(f) Azelaic acid

(b) Heptadecane

(c) Docosane



(d) Hexadecanoic acid



(e) Docosanoic acid

Supplementary Fig. S4. Structural depiction of the labelled compounds measured shown in their non-labelled form.

Supplementary Table S1. Physical and chemical properties of the compounds spiked into the snow in labelled form.

Compound	Formula	Molecular weight (g/mol)	Boiling point (°C)	Melting point (°C)	Water solubility	Vapour pressure[a,b] (mm Hg) at 260°C (0°C)	$\log_{10} K_{ow}$	OH radical reaction rate (cm^3 molec^{-1} s^{-1})[c]
Fluoranthene	$C_{16}H_{10}$	202.25	384	105-110	insol	47 (1.4x10^{-5})	5.16[a]	11x10^{-12}
Heptadecane	$C_{17}H_{36}$	240.47	302	20-22	insol	277 (4.7x10^{-6})	8.69[c]	0.21x10^{-12}
Docosane	$C_{22}H_{46}$	310.60	369	44	insol	50 (5.6x10^{-7})	na	0.21x10^{-12}
Hexadecanoic acid	$C_{16}H_{32}O_2$	256.42	215	63-64	insol	57 (1.2x10^{-12})	7.17[a]	0.81x10^{-12}
Docosanoic acid	$C_{22}H_{44}O_2$	340.59	306	80	insol	1.9 (3.7x10^{-17})	na	0.81x10^{-12}
Azelaic acid	$C_9H_{16}O_4$	188.22	225-286	106.5	sol	36 (1.5x10^{-10})	1.57[a]	na
Benzo[a]pyrene	C20H12	252.31	495	179	insol	7.7 (7.1x10^{-11})	6.04[d]	–
Glucose	C6H12O6	180.16		150-152	sol	na	-3.24[e]	–
Levoglucosan	C6H10O5	162.14		182-184	sol	na	na	–

[a] Yaws C.L. 2003. *Yaws' handbook of thermodynamic and physical properties of chemical compounds.* Norwich, NY: Knovel.

[b] Pressures at 260°C were calculated from the Antoine equation, coefficients from *Yaws' handbook* (2003); pressures at 0°C were extrapolated from the same equation.

[c] Fluoranthene value from Brubaker W.W. & Hites R.W. 1998. OH reaction kinetics of polycyclic aromatic hydrocarbons and polychlorinated dibenzo-p-dioxins and dibenzofurans. *The Journal of Physical Chemistry A 102,* 915-921. Alkanes and alkanoic acids are general values for those compound classes from Neeb P. 2000. Structure-reactivity based estimation of the rate constants for hydroxyl radical reactions with hydrocarbons. *Journal of Atmospheric Chemistry 35*, 295-315.

[d] Yaws C.L. 2008. *Yaws' handbook of properties for environmental and green engineering*. Houston, TX: Gulf Publishing.

[e] Verschueren K. 2001. *Handbook of environmental data on organic chemicals.* 4th edn. New York: John Wiley & Sons.