

Supplemental Information

Photodegradation of Bitumen-Derived Organics in Oil Sands Process-Affected Water

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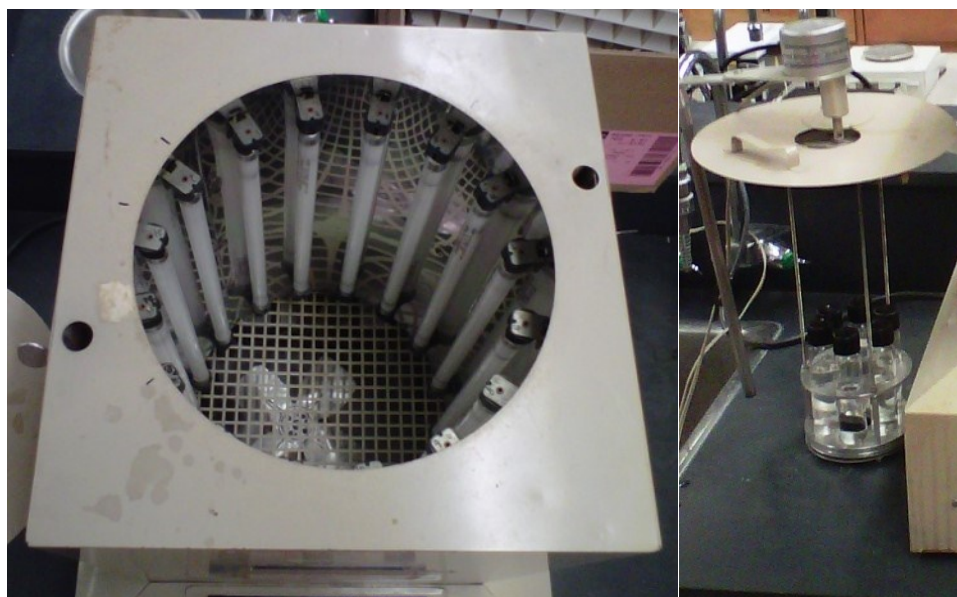


Figure S1: Photoreactor used for the photolysis of dissolved organic species in OSPW, AEO, and BEO samples over 18 days. The chamber (left) contains 16 medium pressure mercury bulbs. The rotating carousel (right) suspends the 50 mL glass tubes containing the test solutions in the centre of the photolysis chamber.

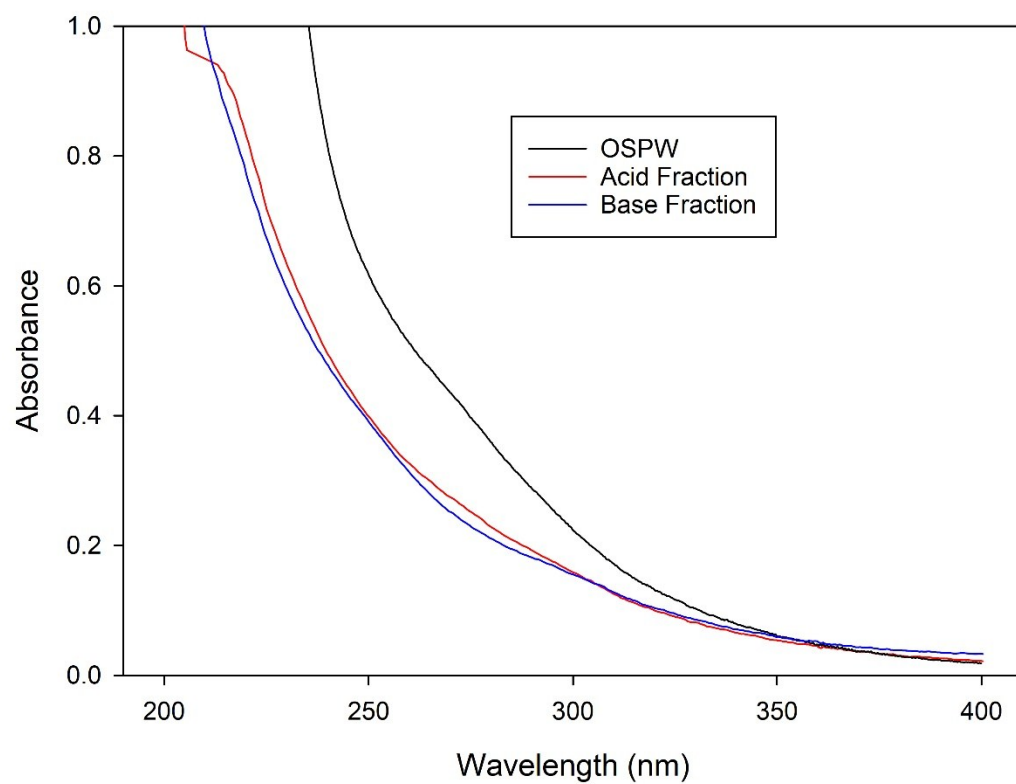
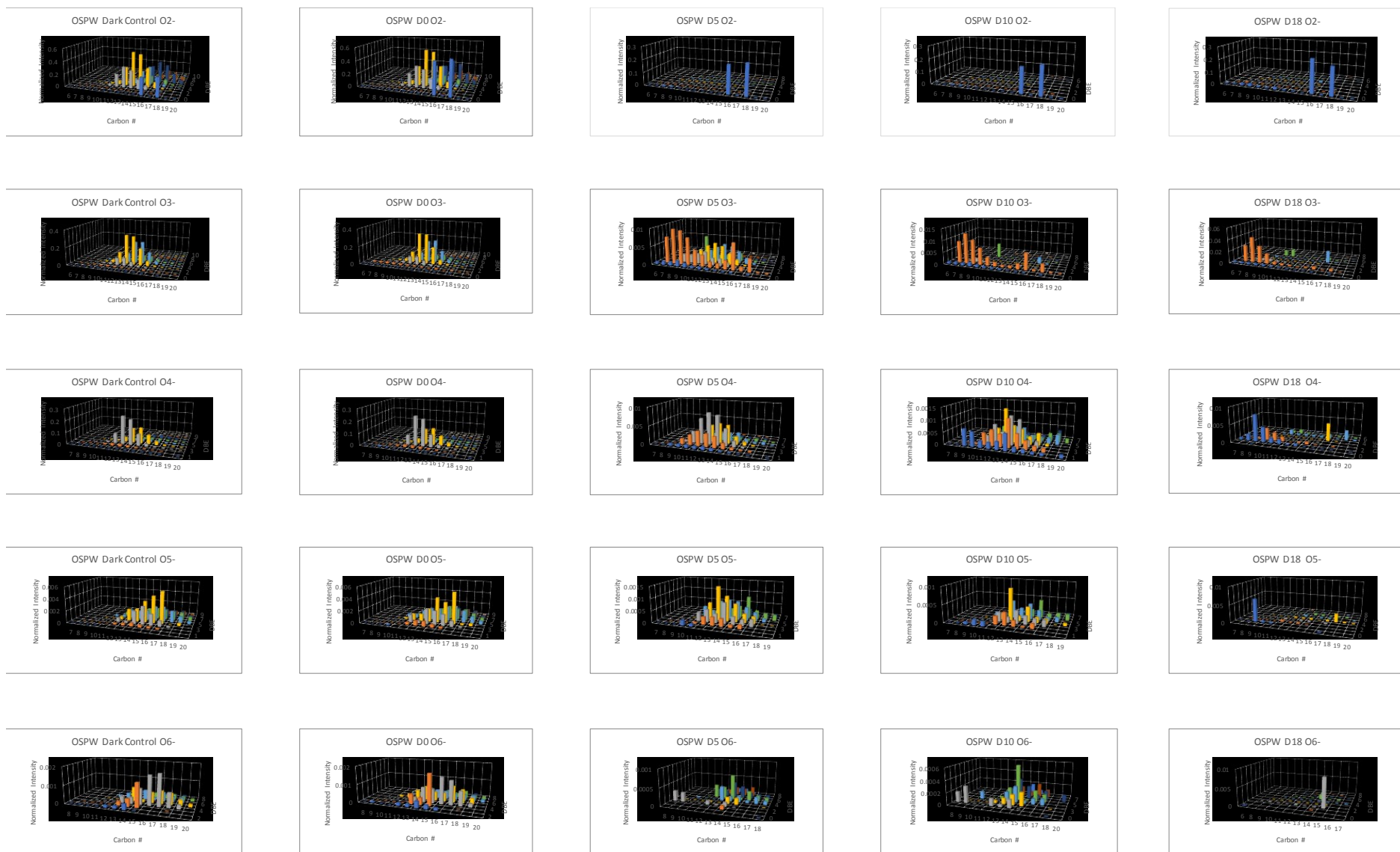
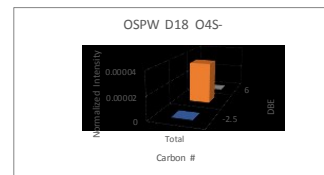
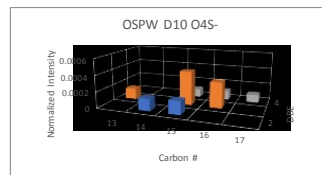
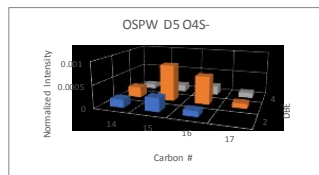
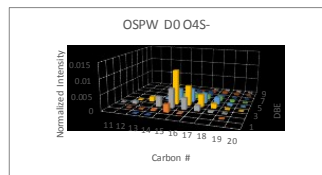
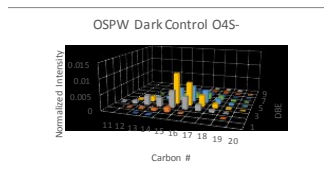
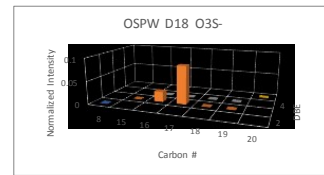
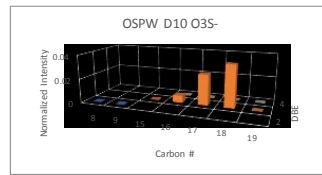
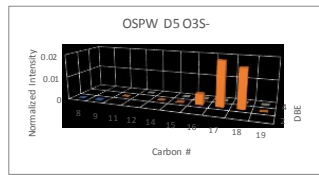
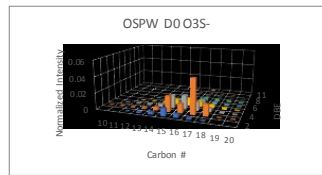
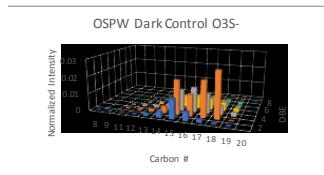
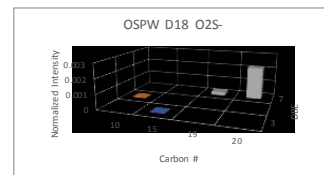
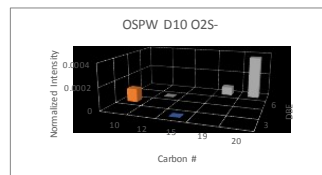
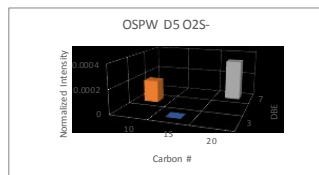
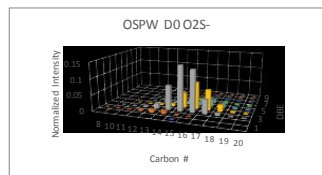
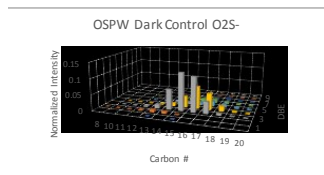
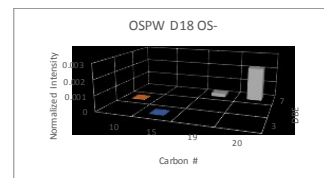
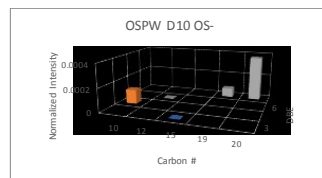
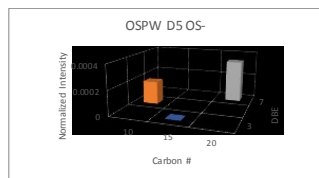
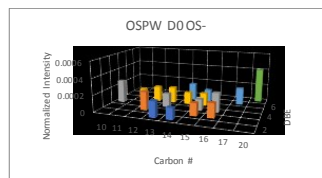
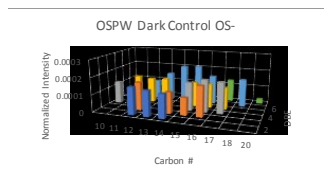
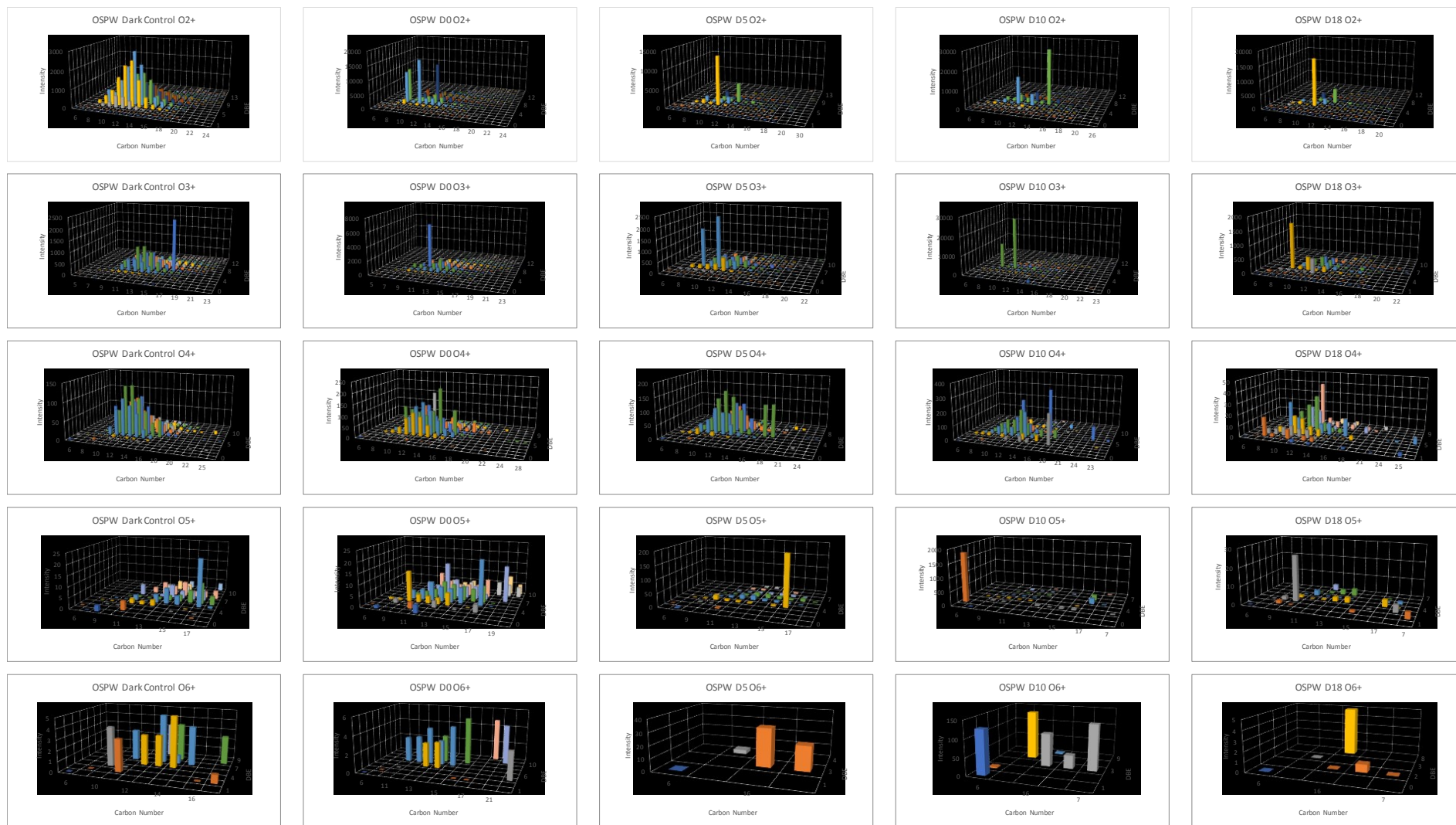


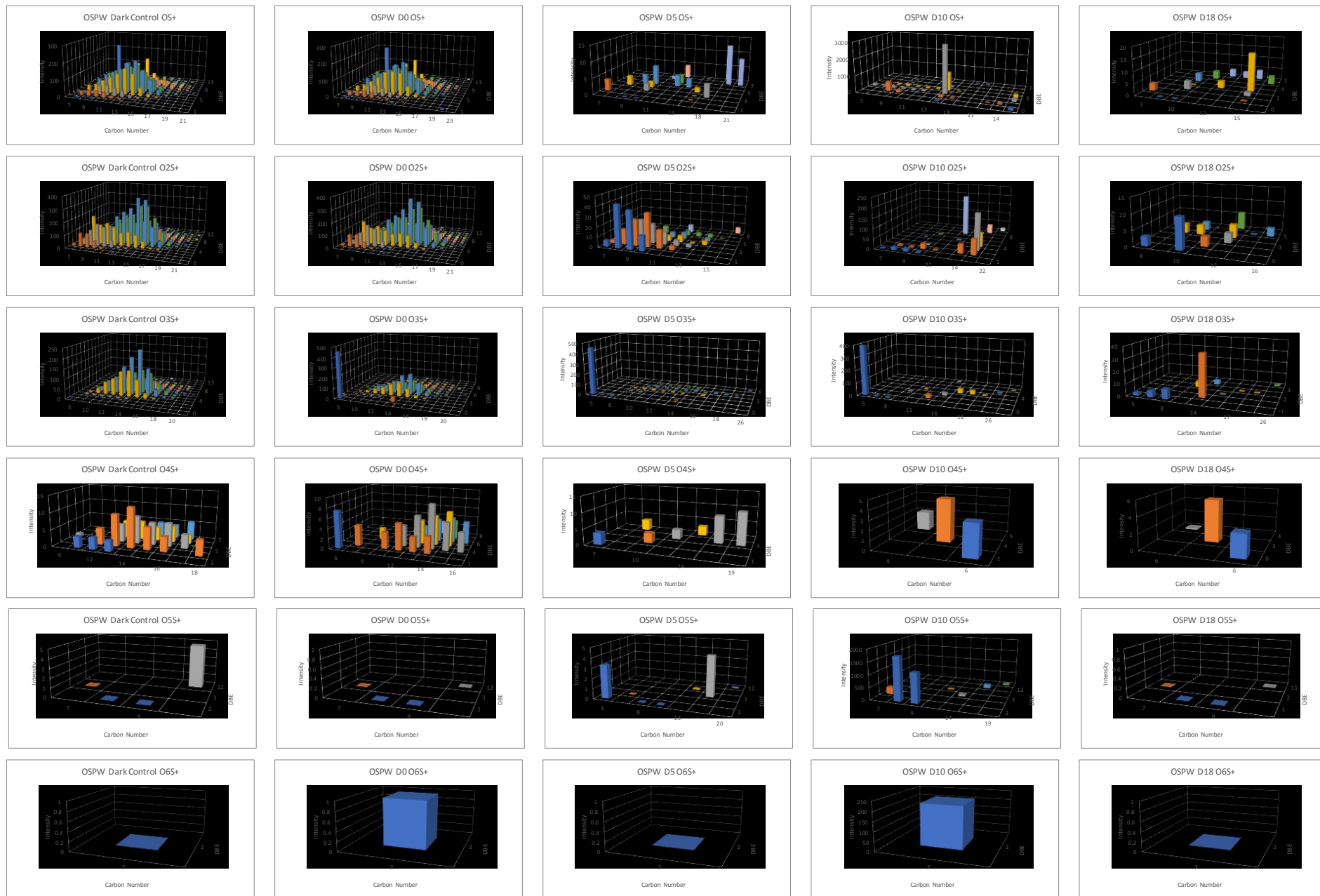
Figure S2: Absorption spectra (200-400 nm) of all sample types measured at Day 0 and 18.

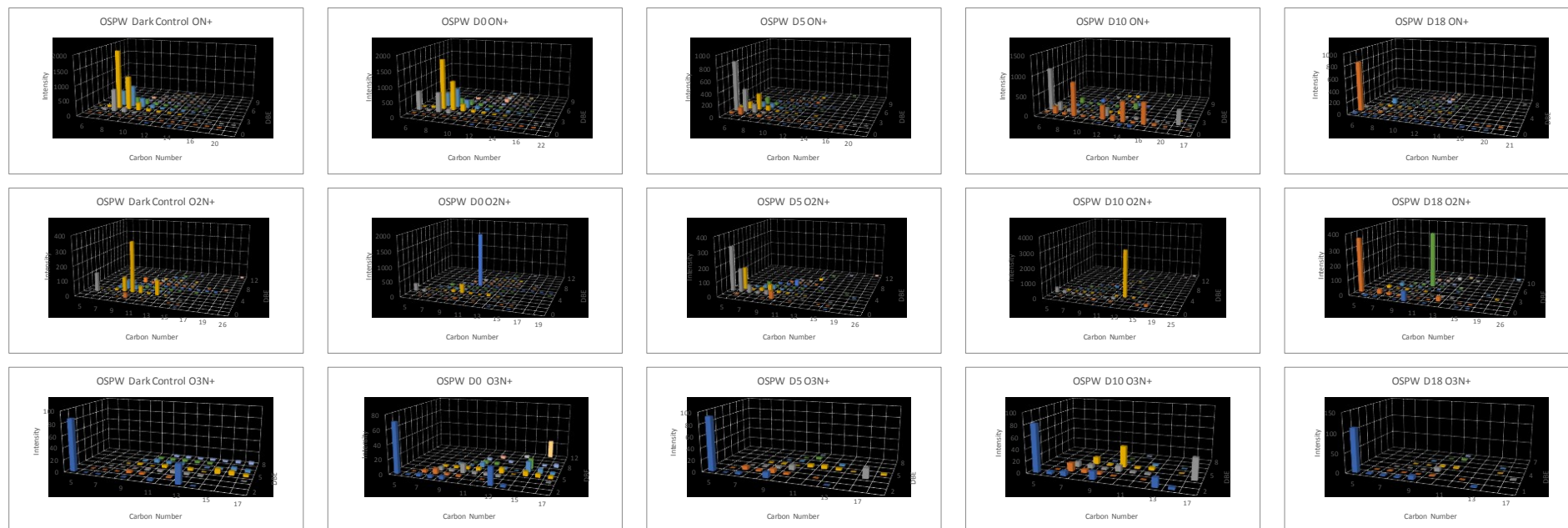
Figure S3: Fingerprints of Dark control, D0, D5, D10 and D18 for O₂, O₃, O₄, SO₂, SO₃ and SO₄ in OSPW and acid-extractable organics fraction (AEO) in both positive and negative modes, and base-extractable organics fraction (BEO) in positive mode.

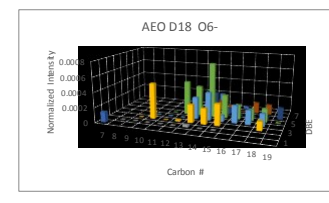
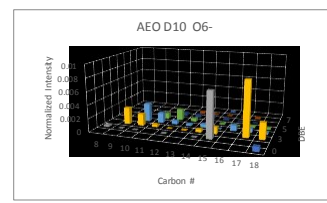
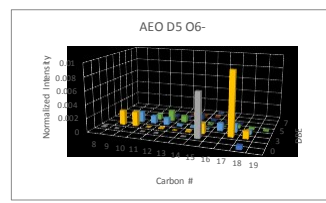
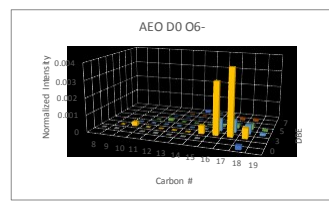
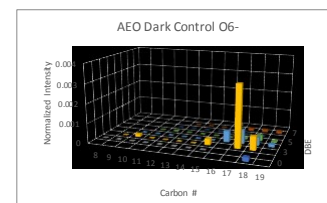
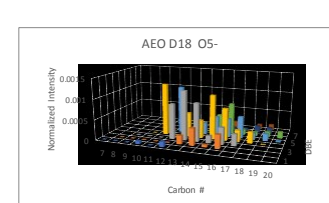
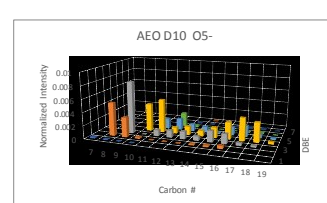
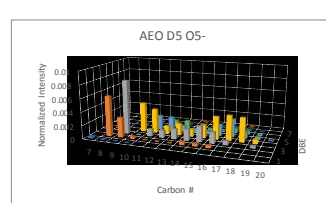
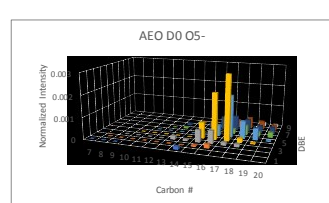
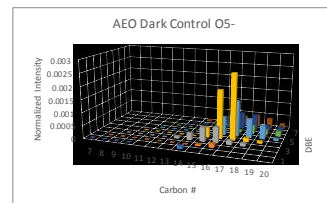
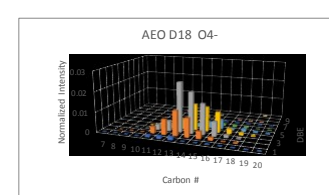
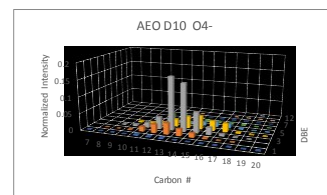
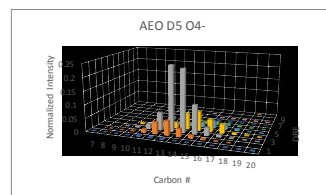
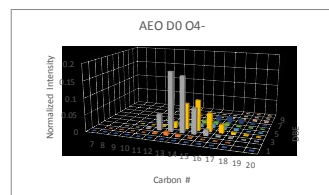
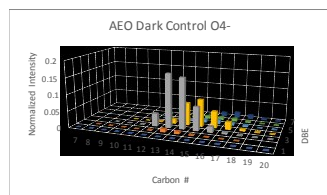
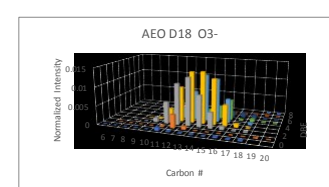
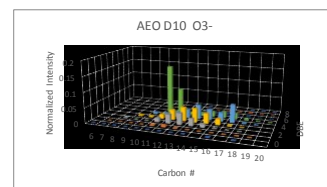
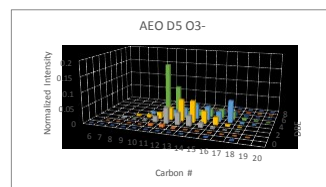
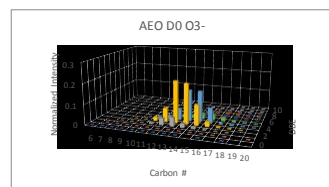
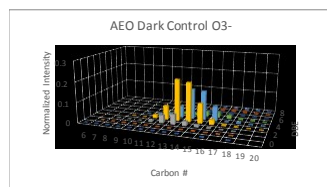
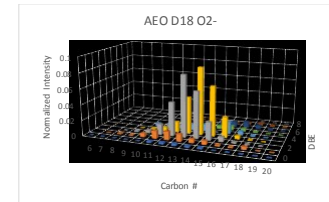
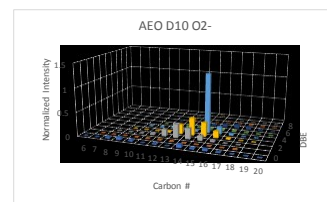
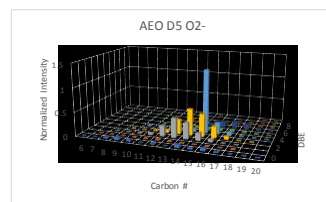
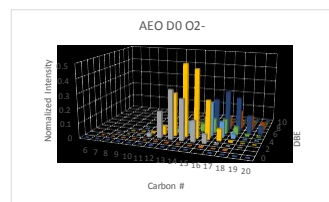
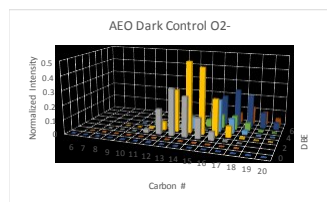


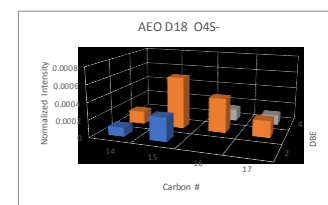
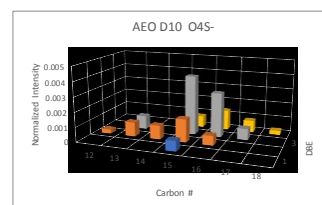
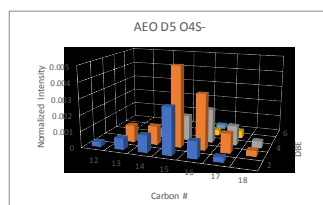
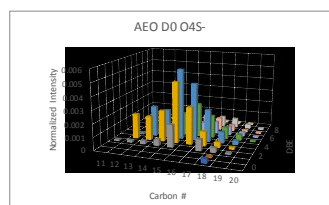
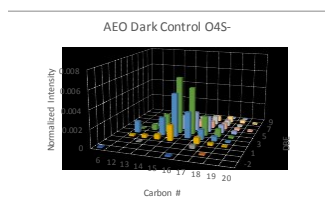
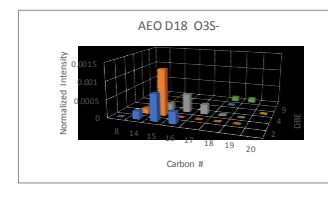
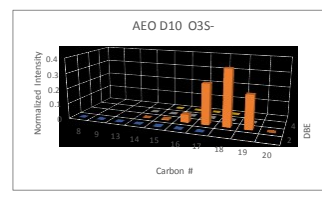
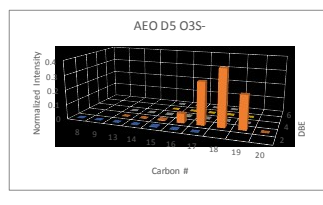
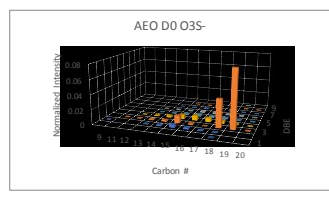
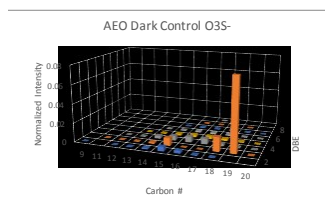
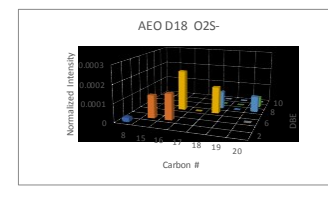
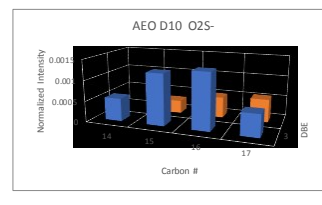
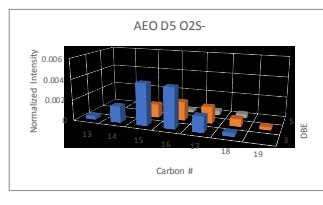
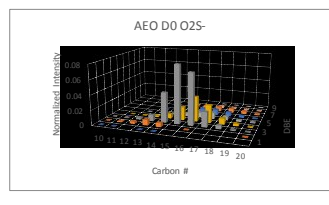
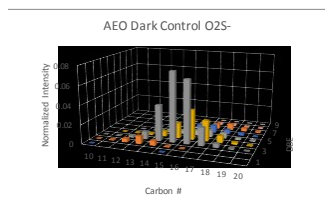
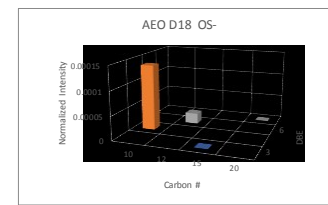
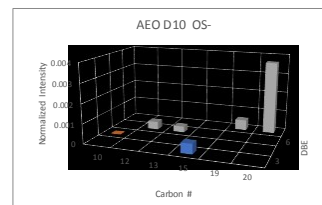
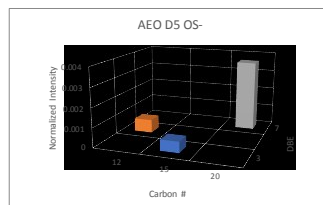
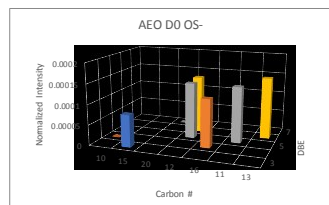
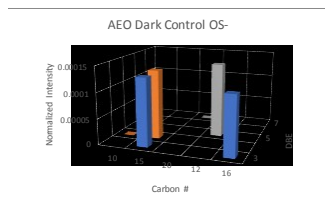


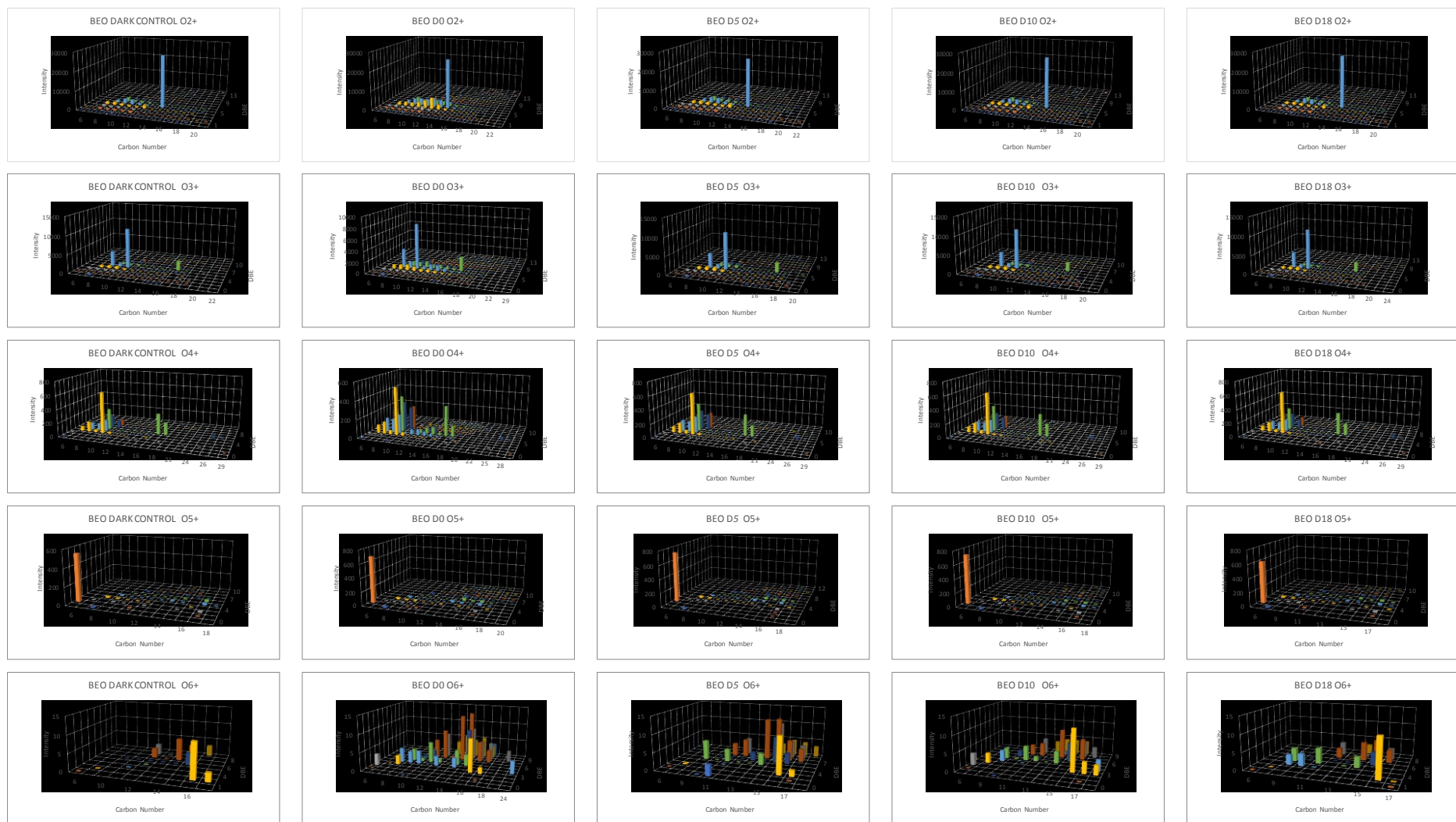


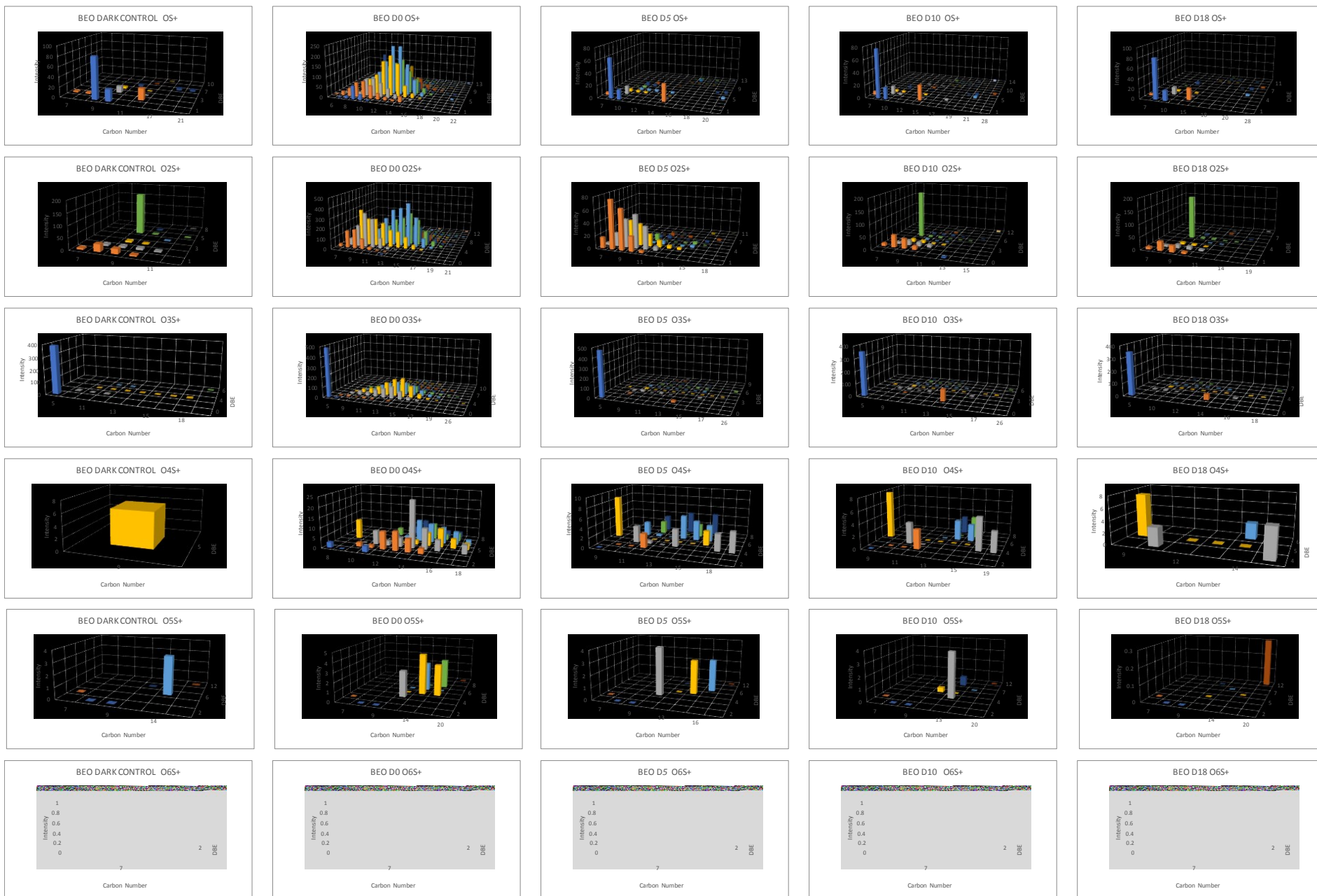












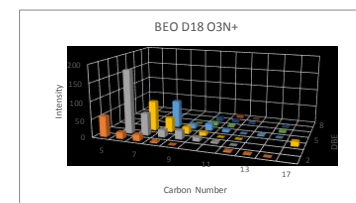
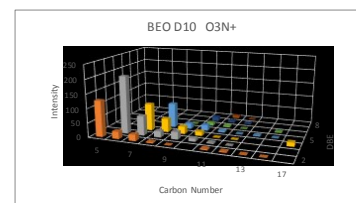
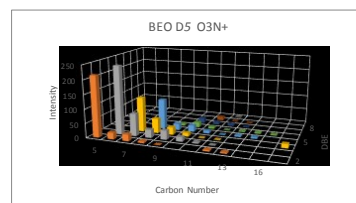
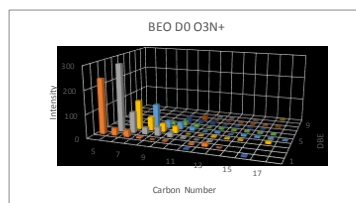
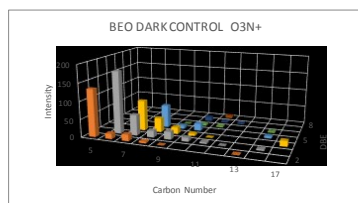
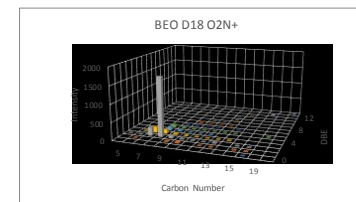
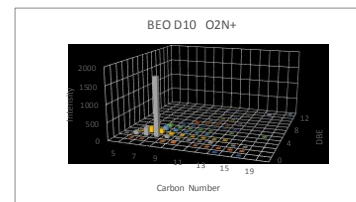
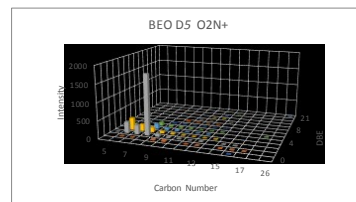
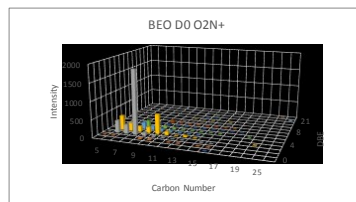
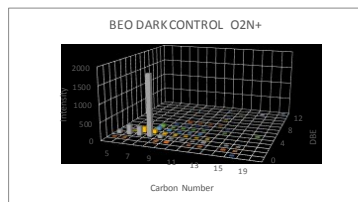
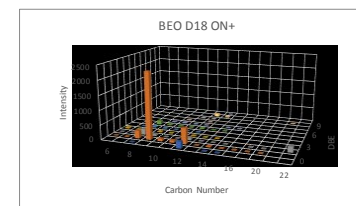
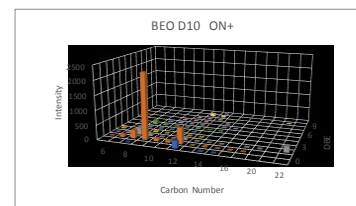
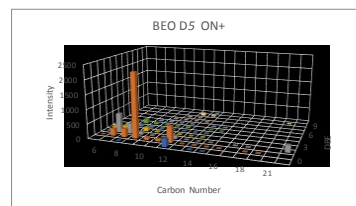
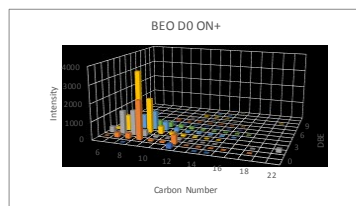
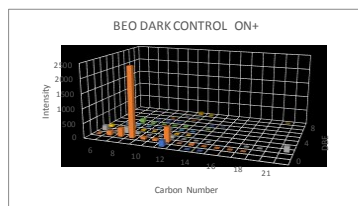
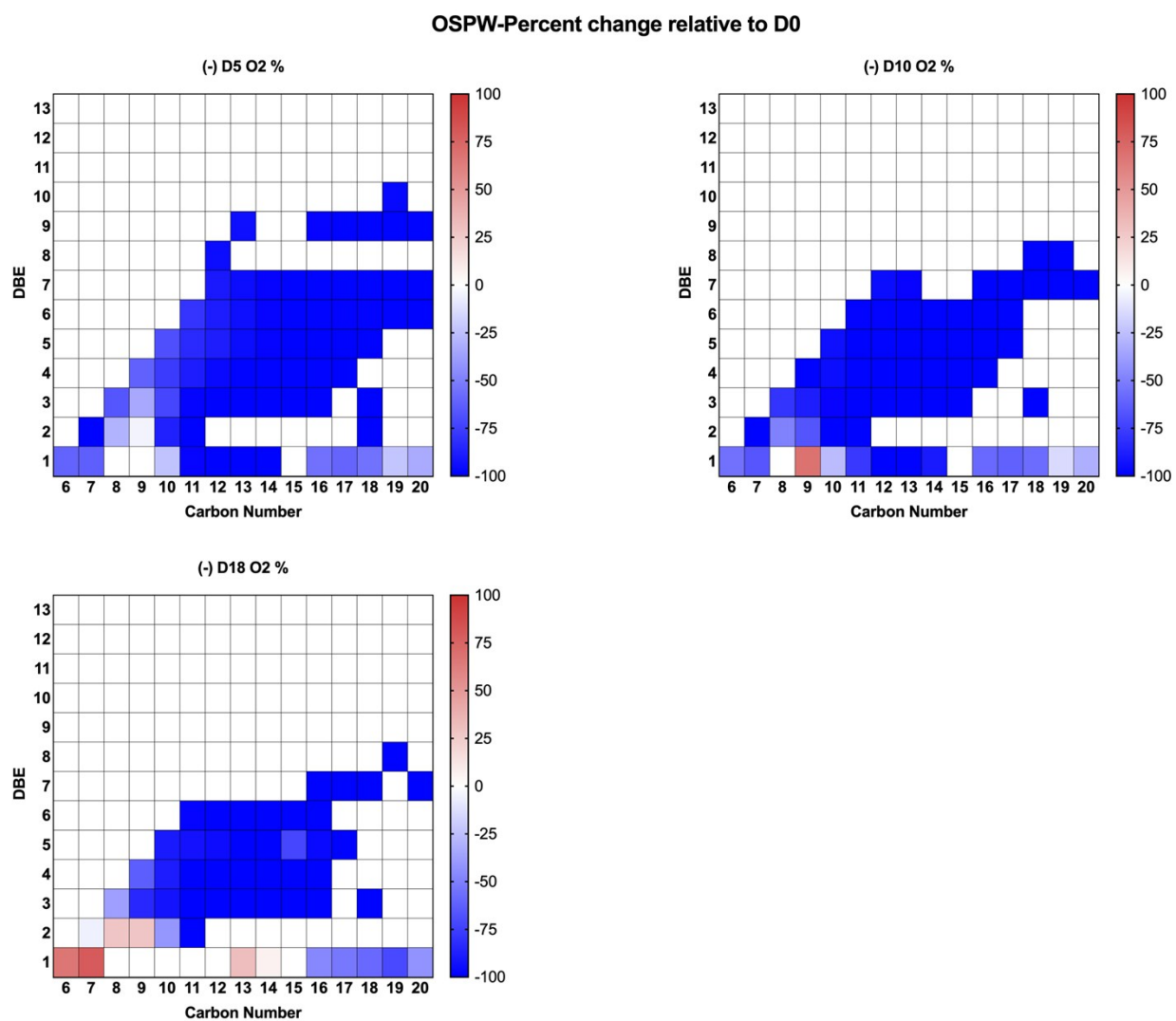
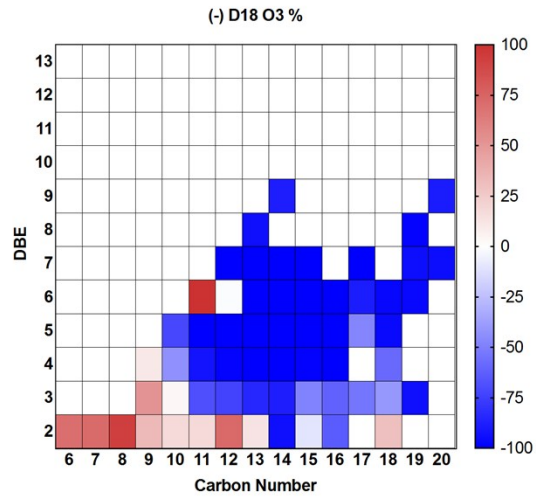
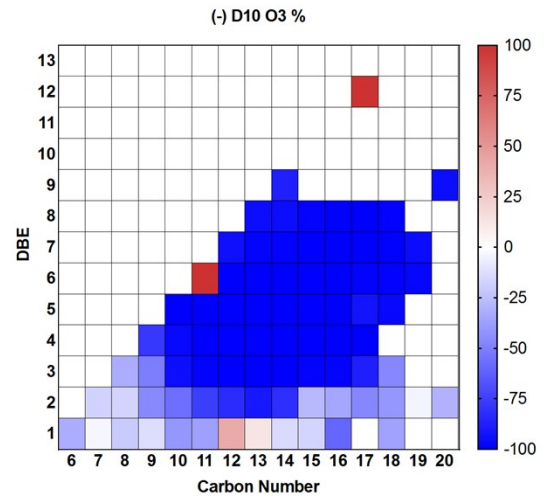
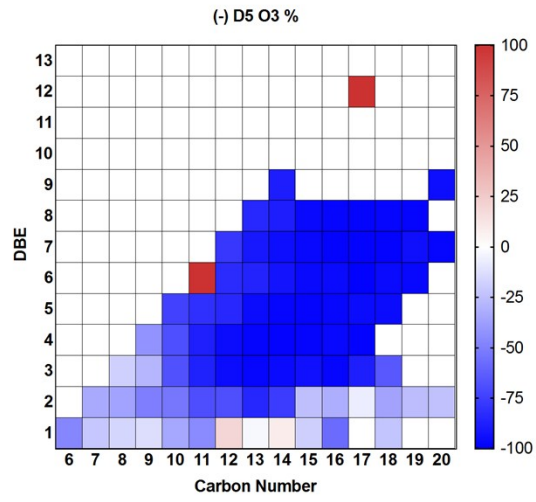


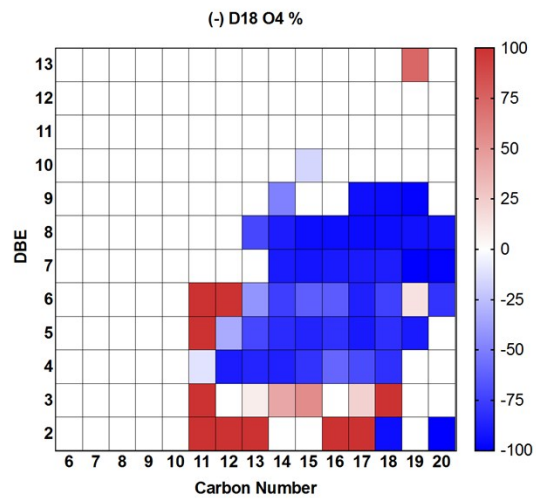
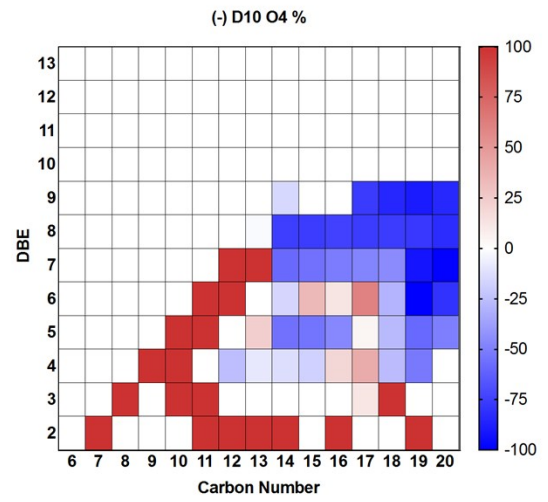
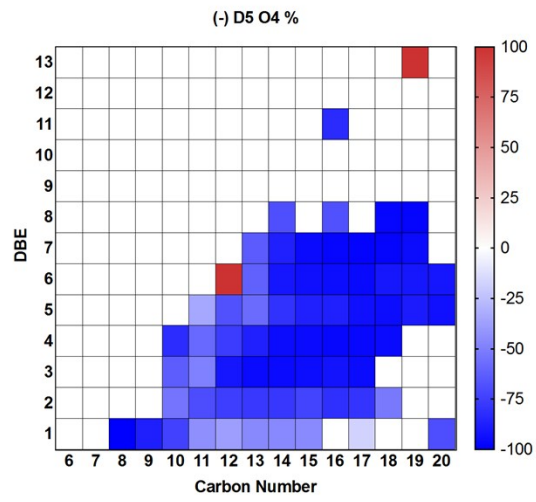
Figure S4: Heat maps of percent change relative to Day 0 for heteroatomic classes in OSPW on Days 5, 10, and 18 in negative and positive mode, and with respect to DBE and carbon number.



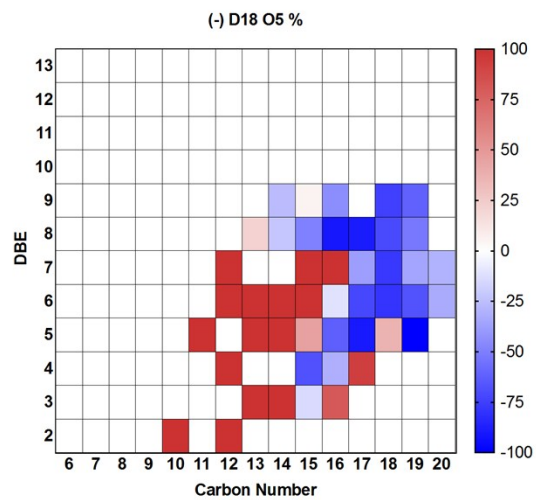
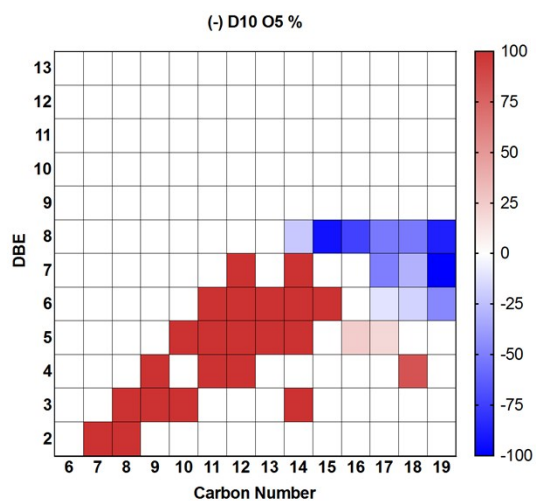
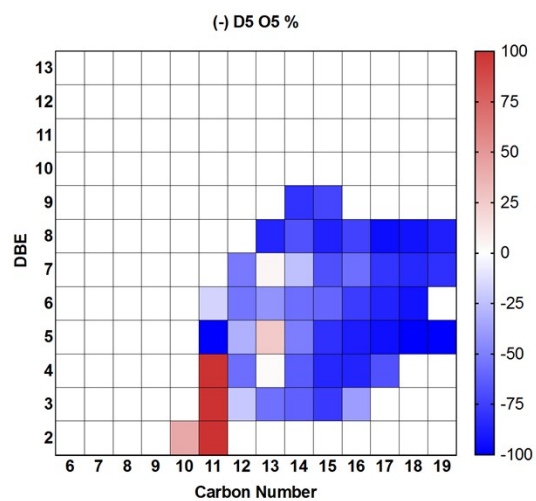
OSPW-Percent change relative to D0



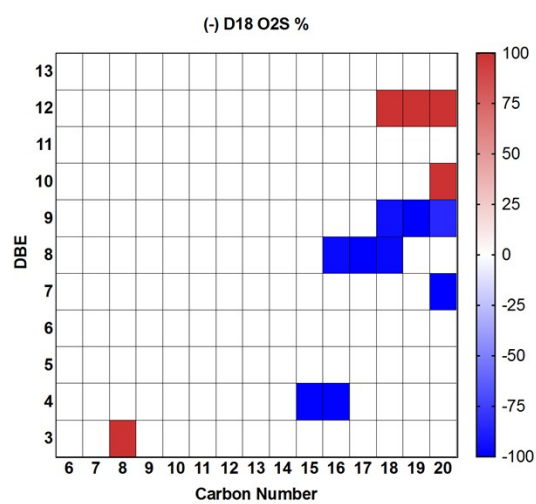
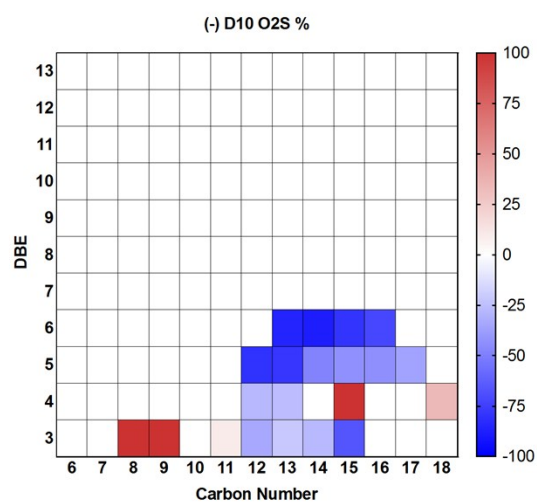
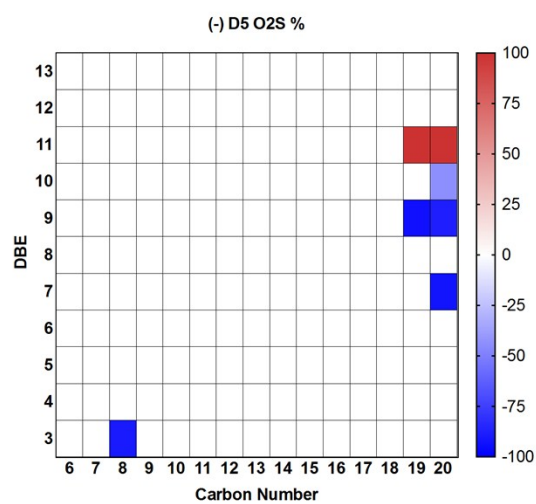
OSPW-Percent change relative to D0



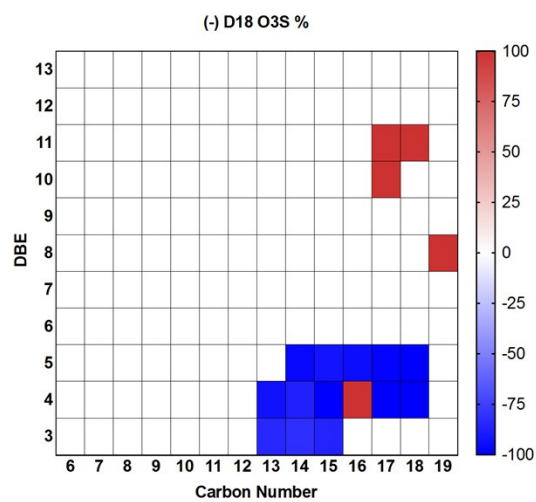
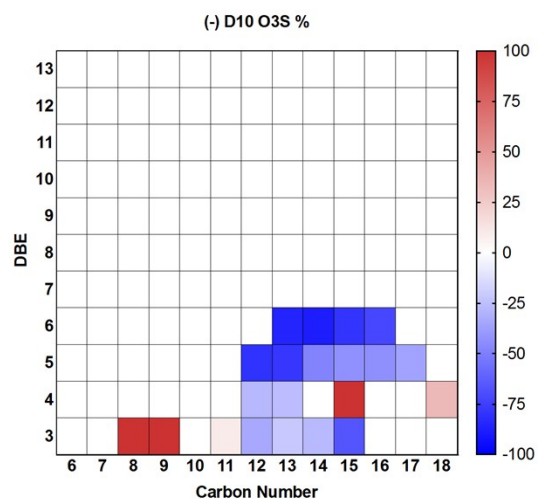
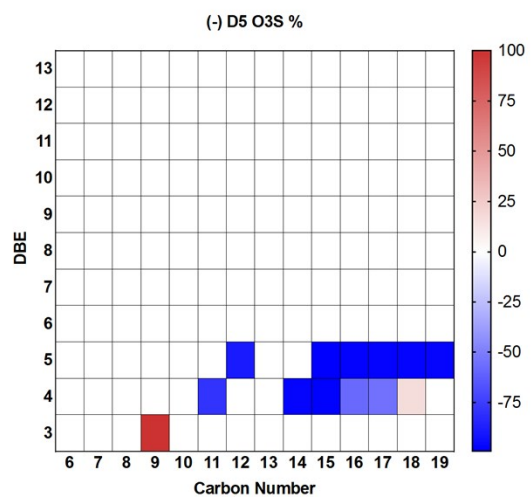
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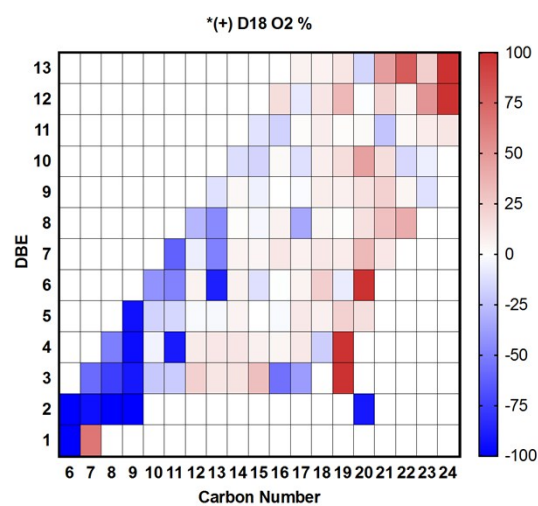
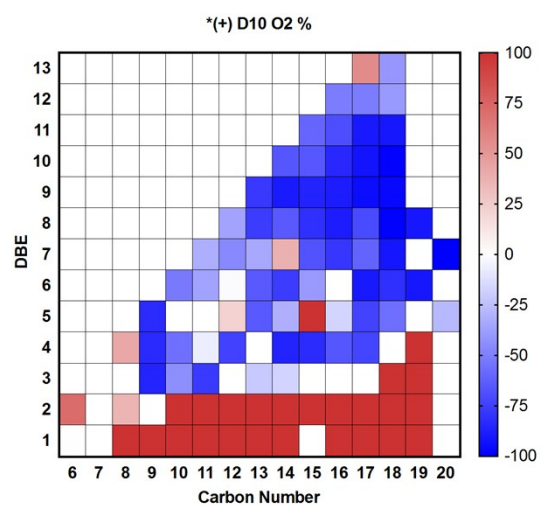
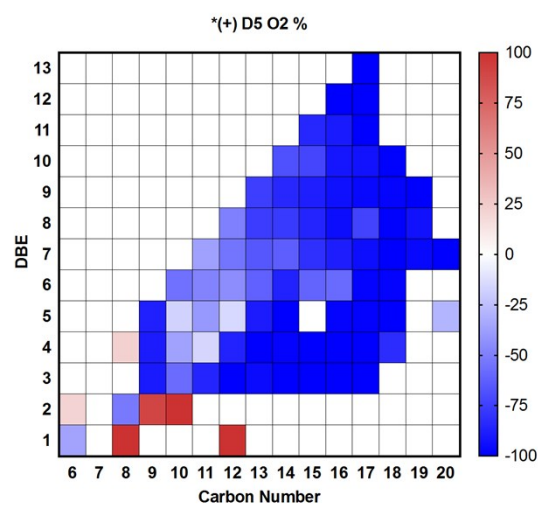
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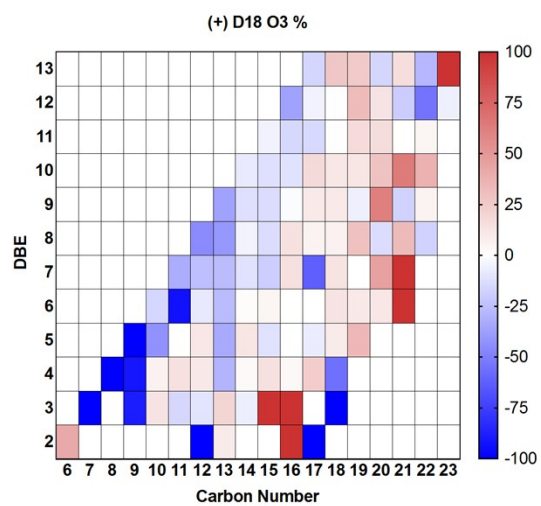
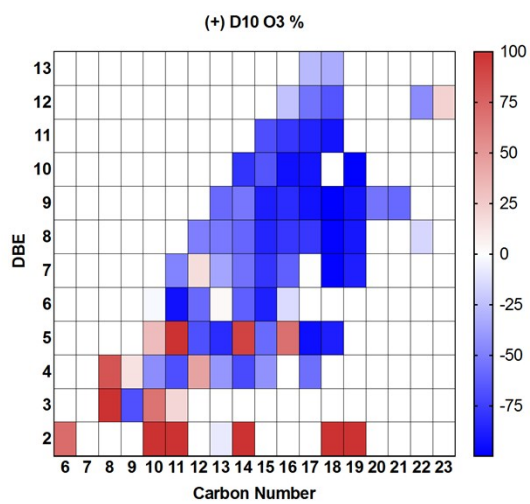
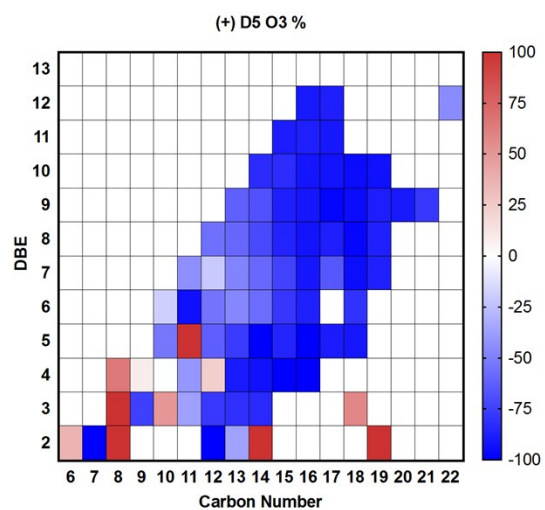
OSPW-Percent change relative to D0



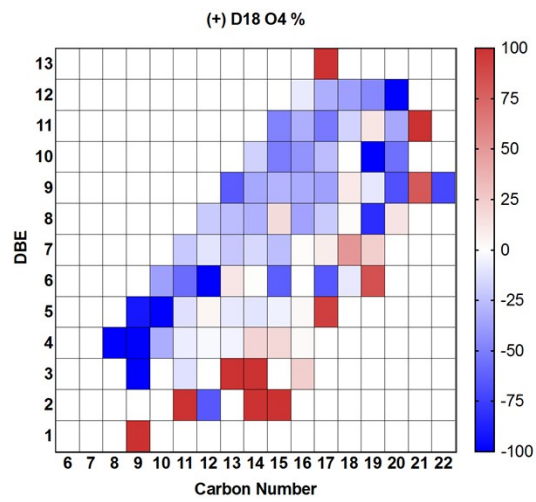
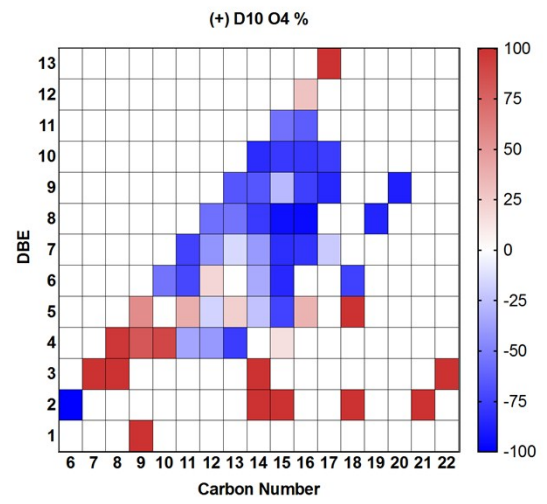
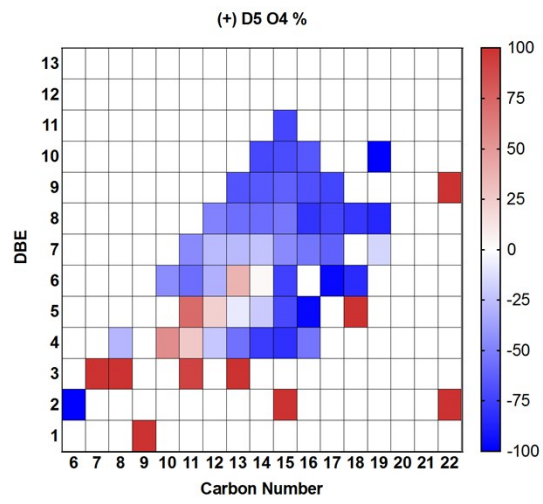
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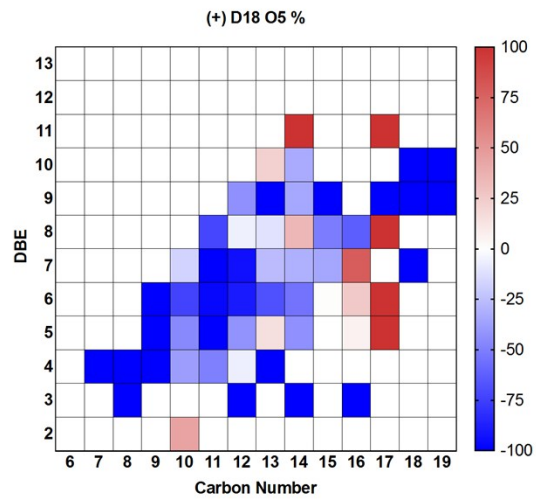
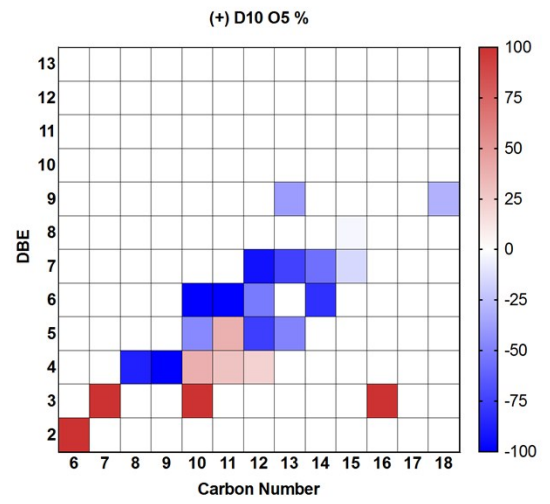
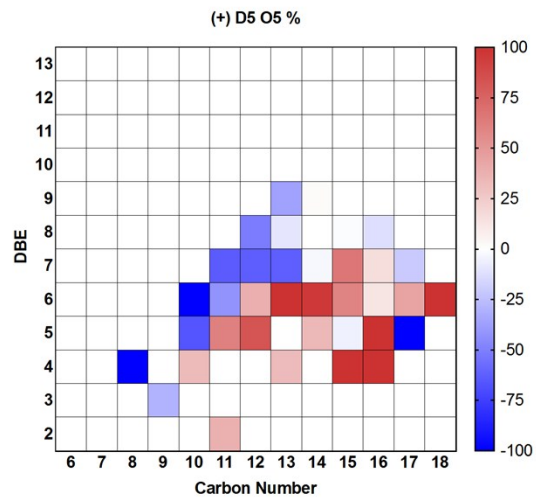
OSPW-Percent change relative to D0



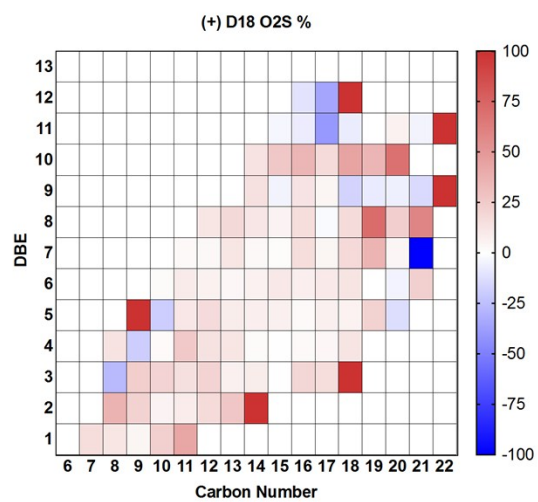
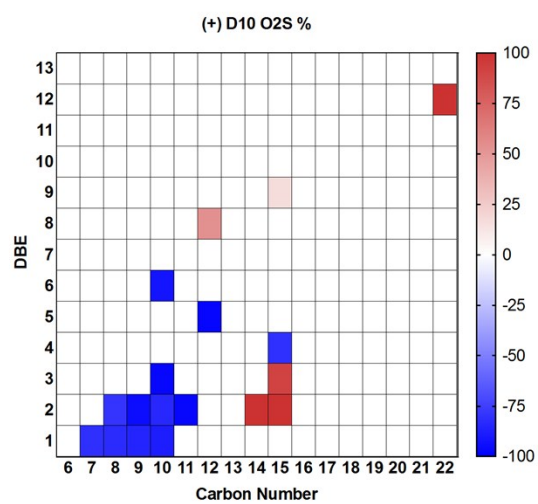
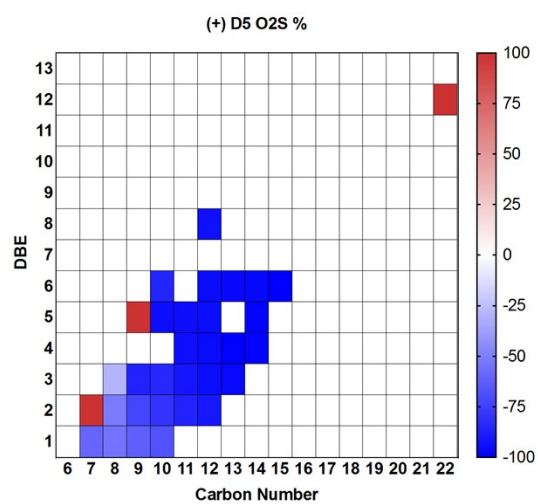
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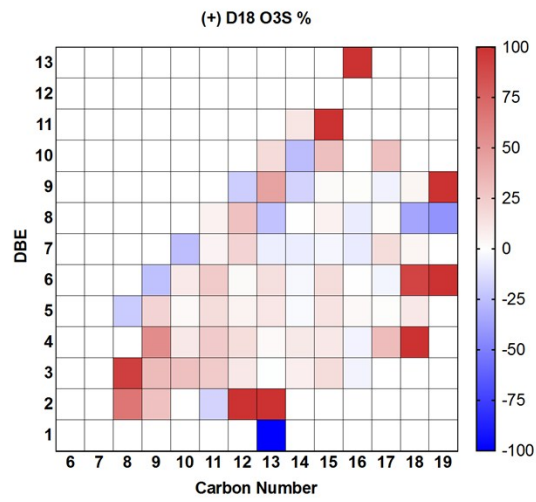
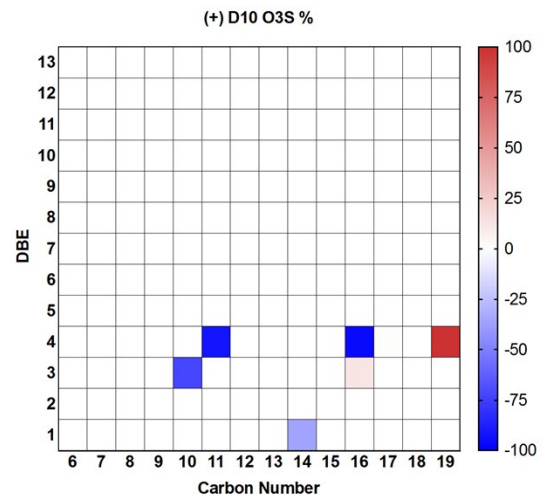
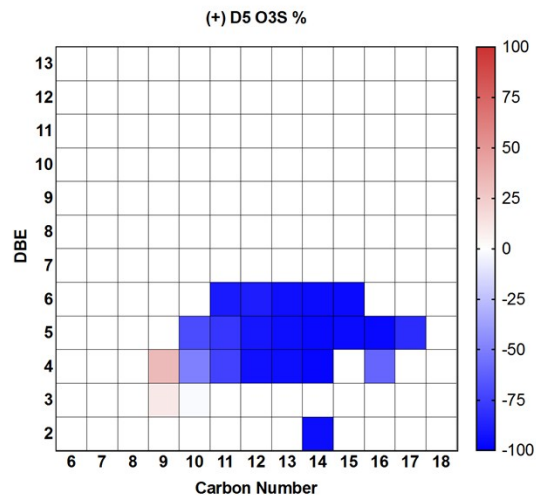
OSPW-Percent change relative to D0



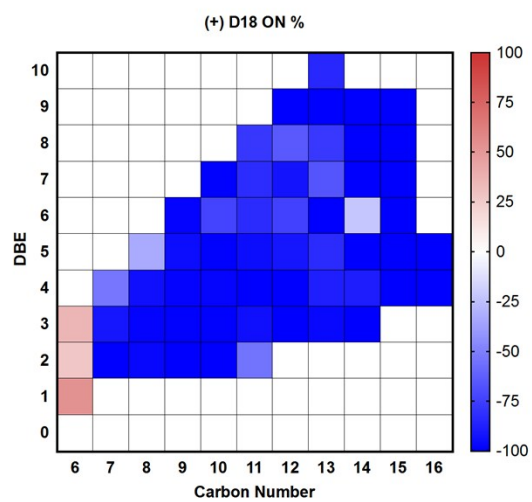
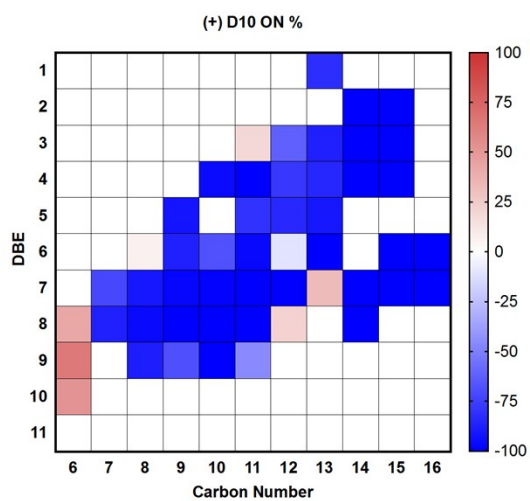
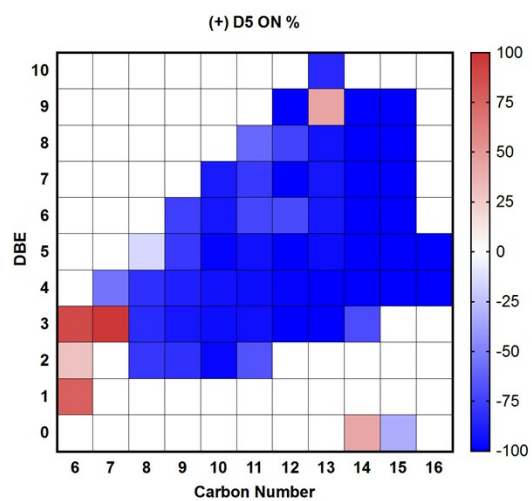
OSPW-Percent change relative to D0



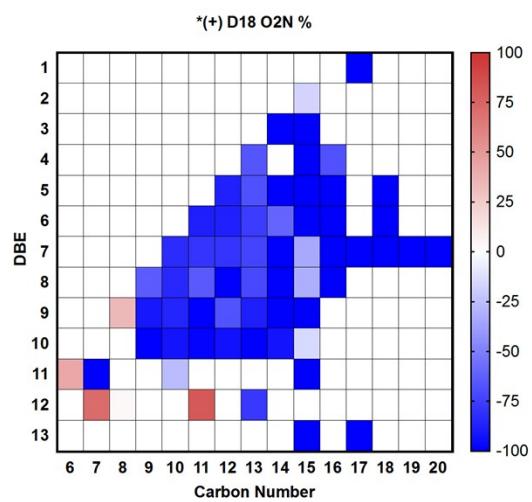
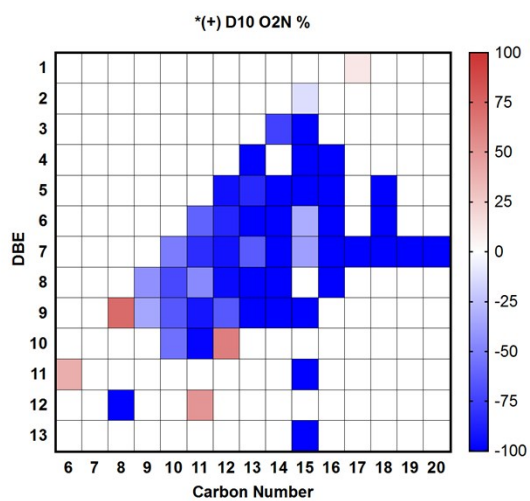
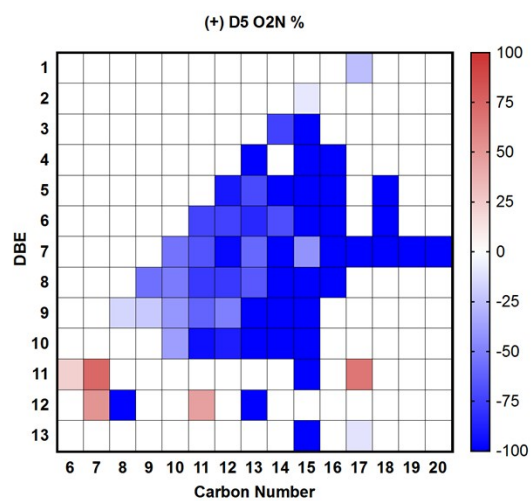
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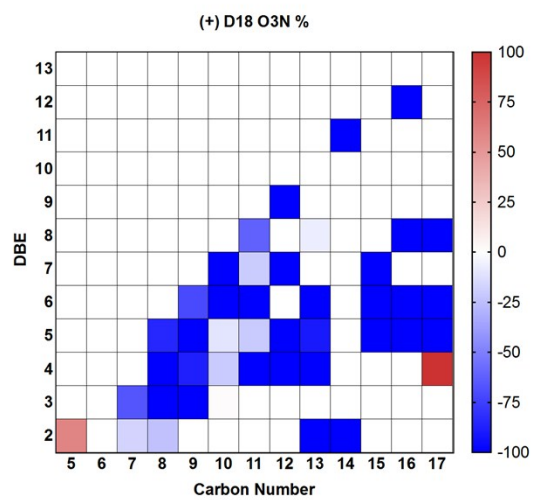
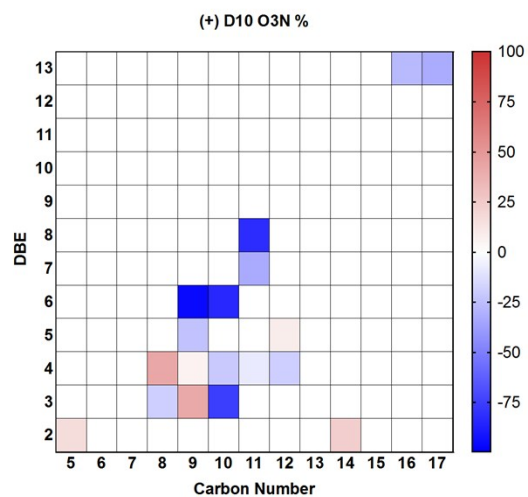
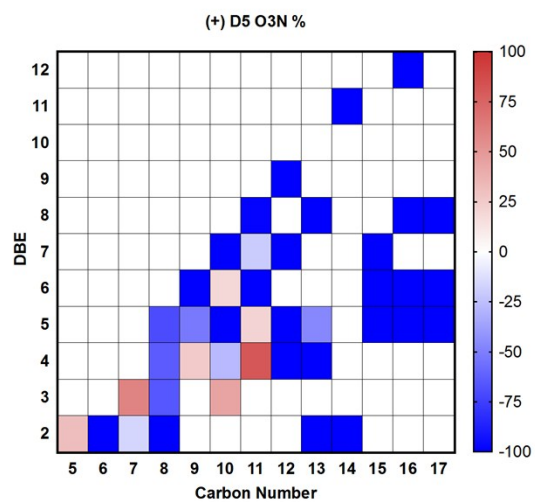
OSPW-Percent change relative to D0



OSPW-Percent change relative to D0



OSPW-Percent change relative to D0



Tables

Table S1: Mean intensity (as measured in negative mode and blank-subtracted) of total and individual heteroatomic classes in OSPW triplicate samples exposed to light for 0, 5, 10, and 18 days, and corresponding blank and dark control samples. The percent removal indicates the reduction in intensity compared to the D0 samples. Negative values indicate an increase in intensity (i.e., presence of a heteroatomic class) over time.

	OSPW Blank	D18 OSPW Dark	D0 OSPW Light	D5 OSPW Light	Removal (vs. D0)	D10 OSPW Light	Removal (vs. D0)	D18 OSPW Light	Removal (vs. D0)
Total	2.806	11.087	11.612	0.340	97%	0.176	99%	0.391	97%
O₂	1.253	5.866	6.153	0.026	99%	0.004	100%	0.050	99%
O₃	0.629	2.654	2.717	0.146	95%	0.071	97%	0.154	94%
O₄	0.307	1.444	1.469	0.098	93%	0.018	99%	0.013	99%
O₅	0.104	0.063	0.067	0.017	74%	0.007	89%	0.007	89%
O₆	0.040	0.016	0.019	0.005	73%	0.004	77%	0.006	71%
OS	0.004	0.004	0.003	0.001	84%	0.001	82%	0.002	26%
O₂S	0.001	0.728	0.857	0.000	100%	0.001	100%	0.002	99%
O₃S	0.464	0.225	0.245	0.043	82%	0.068	72%	0.095	61%
O₄S	0.000	0.084	0.081	0.003	96%	0.002	98%	0.000	100%
O₅S	0.000	0.002	0.001	0.000	93%	0.000	86%	0.000	98%
O₆S	0.002	0.000	0.000	0.000	n/a	0.000	n/a	0.063	n/a

Table S2: Mean intensity (as measured in negative mode and blank-subtracted) of total and individual heteroatomic classes in AEO triplicate samples exposed to light for 0, 5, 10, and 18 days, and corresponding blank and dark control samples. The percent removal indicates the reduction in intensity compared to the D0 samples. Negative values indicate an increase in intensity (i.e., presence of a heteroatomic class) over time.

	AEO Blank	D18 AEO Dark	D0 AEO Light	D5 AEO Light	Removal (vs. D0)	D10 AEO Light	Removal (vs. D0)	D18 AEO Light	Removal (vs. D0)
Total	3.776	7.196	8.185	9.471	-16%	6.859	16%	1.041	87%
O₂	1.440	4.812	4.999	5.718	-14%	3.963	21%	0.658	87%
O₃	1.042	1.436	1.489	1.198	20%	0.937	37%	0.171	88%
O₄	0.464	0.883	0.970	1.372	-42%	0.889	8%	0.187	81%
O₅	0.149	0.016	0.018	0.074	-316%	0.062	-248%	0.014	24%
O₆	0.056	0.007	0.011	0.037	-222%	0.036	-215%	0.004	63%
OS	0.006	0.001	0.001	0.005	-556%	0.005	-630%	0.000	97%
O₂S	0.006	0.027	0.442	0.020	95%	0.005	99%	0.001	99%
O₃S	0.611	0.006	0.198	1.021	-416%	0.942	-375%	0.004	98%
O₄S	0.000	0.007	0.057	0.026	56%	0.017	70%	0.002	96%
O₅S	0.000	0.001	0.000	0.001	-136%	0.001	-48%	0.000	100%
O₆S	0.002	0.000	0.000	0.001	n/a	0.001	n/a	0.000	n/a

Table S3: Mean intensity (as measured in positive mode and blank-subtracted) of total and individual heteroatomic classes in OSPW triplicate samples exposed to light for 0, 5, 10, and 18 days, and corresponding blank and dark control samples. The percent removal indicates the reduction in intensity compared to the D0 samples. Negative values indicate an increase in intensity (i.e., presence of the heteroatomic class) over time.

	OSPW Blank	D18 OSPW Dark	D0 OSPW Light	D5 OSPW Light	Removal (vs. D0)	D10 OSPW Light	Removal (vs. D0)	D18 OSPW Light	Removal (vs. D0)
Total	105257.60	91014.42	152805.61	53001.85	65%	169531.91	-11%	41677.50	73%
O₂	67890.80	51741.60	107883.83	37449.35	65%	96634.52	10%	34921.90	68%
O₃	26755.10	19919.83	27006.67	11756.77	56%	54873.07	-103%	6209.20	77%
O₄	8335.80	2478.97	3232.93	2264.37	30%	3223.35	0%	421.50	87%
O₅	1290.50	151.77	230.97	435.17	-88%	2492.52	-979%	40.85	82%
O₆	70.80	40.35	17.73	54.97	-210%	539.35	-2941%	2.85	84%
OS	168.90	5255.70	4998.53	61.97	99%	6702.93	-34%	34.75	99%
O₂S	370.80	8571.95	7800.43	339.38	96%	734.67	91%	21.00	100%
O₃S	116.90	2728.37	1591.31	597.05	62%	559.20	65%	22.65	99%
O₄S	11.80	121.18	42.87	35.32	18%	10.10	76%	2.80	93%
O₅S	237.80	4.70	0.00	7.50	n/a	3539.60	n/a	0.00	n/a
O₆S	8.40	0.00	0.33	0.00	100%	222.60	-66680%	0.00	100%
ON	6138.10	7296.60	6895.09	1666.05	76%	4932.15	29%	579.70	95%
O₂N	3932.00	1296.75	3388.63	1165.82	66%	524.77	55%	1078.75	68%
O₃N	725.9	259.58	311.80	188.05	40%	292.57	6%	165.15	47%

Table S4: Mean intensity (as measured in positive mode and blank-subtracted) of total and individual heteroatomic classes BEO triplicate samples exposed to light for 0, 5, 10, and 18 days, and corresponding blank and dark control samples. The percent removal indicates the reduction in intensity compared to the D0 samples. Negative values indicate an increase in intensity (i.e., presence of the heteroatomic class) over time.

	BEO Blank	D18 BEO Dark	D0 BEO Light	D5 BEO Light	Removal (vs. D0)	D10 BEO Light	Removal (vs. D0)	D18 BEO Light	Removal (vs. D0)
Total	43981.90	83411.64	198698.77	96629.38	44%	87426.47	49%	93231.83	53%
O₂	17401.90	55374.90	112070.43	63096.65	44%	57315.58	49%	55339.95	50%
O₃	9789.70	24338.77	37234.90	27391.77	26%	25417.83	32%	24706.73	34%
O₄	12631.40	2631.27	4386.67	3429.85	22%	3091.72	30%	2769.73	37%
O₅	2211.90	720.27	1217.23	1166.58	4%	1002.93	18%	833.95	31%
O₆	227.50	40.23	151.37	122.85	19%	112.22	26%	65.05	57%
OS	275.10	59.57	4975.63	197.08	96%	90.15	98%	63.12	98%
O₂S	373.10	226.53	8983.83	554.58	94%	312.15	97%	251.47	97%
O₃S	546.50	10.73	2602.27	597.33	77%	43.12	98%	26.22	99%
O₄S	140.50	6.07	182.43	63.13	65%	35.77	80%	18.53	90%
O₅S	368.90	3.30	6.50	9.55	-47%	5.00	23%	0.30	95%
O₆S	15.40	0.00	0.00	0.00	n/a	0.00	n/a	0.00	n/a
ON	2168.00	5252.70	19091.45	6638.92	65%	5078.66	73%	4782.56	75%
O₂N	1731.10	3413.67	5728.10	4009.05	30%	3253.77	43%	2147.05	49%
O₃N	545.50	760.43	1456.48	1158.00	21%	897.28	38%	726.17	50%

Table S5: Total number of species detected in blank-subtracted OSPW and AEO (as measured in negative mode) and OSPW and BEO (as measured in positive mode) triplicate samples exposed to light for 0, 5, 10, and 18 days.

	D0	D5	D10	D18
OSPW (neg mode)	356	329	276	247
AEO	305	353	351	276
OSPW (pos mode)	875	456	546	390
BEO	1031	545	443	370

Table S6: Kinetics model data for heteroatomic classes measured in negative mode in OSPW and AEO samples over the course of the 18-day photolysis study. Data were averaged by specific chemical formulae within heteroatomic class, and both weak and strong first-order kinetics relationships were considered (i.e., R^2 values >0.1 and >0.5) in order to include groups experiencing an initial increase on Days 5 or 10. Paired compounds were for specific identical formulae measured in both OSPW and AEO samples with R^2 values above the designated threshold.

APCI Negative		All compounds ($R^2>0.1$)				Paired compounds ($R^2>0.1$)				All compounds ($R^2>0.5$)				Paired compounds ($R^2>0.5$)			
		R^2	n	Slope	$t_{1/2}$ (d)	R^2	n	Slope	$t_{1/2}$ (d)	R^2	n	Slope	$t_{1/2}$ (d)	R^2	n	Slope	$t_{1/2}$ (d)
OSPW	O ₂	0.61	25	-0.10	11.18	0.91	5	-0.39	1.92	0.74	18	-0.13	7.44	0.89	2	-0.34	2.06
AEO	O ₂	0.85	65	-0.12	7.05	0.54	5	-0.07	11.69	0.90	59	-0.13	6.25	0.86	2	-0.12	5.83
OSPW	O ₃	0.63	63	-0.12	14.86	0.67	24	-0.22	5.42	0.77	43	-0.15	9.74	0.79	14	-0.30	2.98
AEO	O ₃	0.78	63	-0.10	9.49	0.68	24	-0.10	9.93	0.88	53	-0.12	6.56	0.83	14	-0.13	7.86
OSPW	O ₄	0.76	56	-0.23	6.26	0.77	35	-0.29	4.31	0.86	46	-0.26	4.27	0.85	28	-0.34	2.80
AEO	O ₄	0.76	51	-0.11	9.30	0.79	35	-0.12	8.22	0.84	44	-0.12	7.27	0.83	28	-0.11	7.12
OSPW	O ₅	0.75	41	-0.14	7.29	0.79	19	-0.20	4.61	0.80	36	-0.15	5.73	0.78	9	-0.24	3.73
AEO	O ₅	0.59	25	-0.03	12.57	0.56	19	-0.04	12.69	0.82	14	-0.05	10.22	0.82	9	-0.07	10.57
OSPW	O ₆	0.71	25	-0.12	13.58	0.67	5	-0.09	9.74	0.89	12	-0.14	5.96	0.66	2	-0.20	3.98
AEO	O ₆	0.57	11	-0.03	11.03	0.40	5	-0.02	12.75	0.75	7	-0.04	9.66	0.63	2	-0.08	8.92
OSPW	O S	0.83	2	0.00	7.28	n/a	0	n/a	n/a	0.83	2	0.00	7.28	n/a	0	n/a	n/a
AEO	O S	0.54	2	0.03	4.73	n/a	0	n/a	n/a	0.71	1	0.19	3.70	n/a	0	n/a	n/a
OSPW	O ₂ S	0.60	3	-0.09	9.25	n/a	0	n/a	n/a	0.67	2	-0.09	10.37	n/a	0	n/a	n/a
AEO	O ₂ S	0.85	8	-0.34	3.39	n/a	0	n/a	n/a	0.95	7	-0.38	1.84	n/a	0	n/a	n/a
OSPW	O ₃ S	0.50	9	-0.07	11.48	0.55	6	-0.11	6.31	0.66	5	-0.12	10.52	0.69	4	-0.15	4.33
AEO	O ₃ S	0.81	23	-0.06	9.07	0.82	6	-0.01	5.26	0.84	22	-0.06	6.01	0.85	4	-0.03	6.77
OSPW	O ₄ S	0.87	7	-0.31	2.72	0.87	7	-0.31	2.72	0.87	7	-0.31	2.72	0.87	6	-0.34	2.16
AEO	O ₄ S	0.83	13	-0.10	6.77	0.79	7	-0.14	5.34	0.86	12	-0.10	6.71	0.84	6	-0.15	4.97

Positive slopes are denoted by bold font and half-lives are in days.

Table S7: Kinetics model data for compound groups measured in positive mode in OSPW and BEO samples over the course of the 18-day photolysis study. Data were averaged by specific chemical formulae within heteroatomic class, and both weak and strong first-order kinetics relationships were considered (i.e., R^2 values >0.1 and >0.5) in order to include groups experiencing an initial increase on Days 5 or 10. Paired compounds were for specific identical formulae measured in both OSPW and BEO samples with R^2 values above the designated threshold. Positive slopes are denoted by bold font and half-lives are in days.

APCI Positive	All compounds (all $R^2>0.1$)					Paired compounds (all $R^2>0.1$)					All compounds (all $R^2>0.5$)					Paired compounds (all $R^2>0.5$)				
	R^2	n	Slope	$t_{1/2}$ (d)		R^2	n	Slope	$t_{1/2}$ (d)		R^2	n	Slope	$t_{1/2}$ (d)		R^2	n	Slope	$t_{1/2}$ (d)	
OSPW O2	0.58	68	-0.11	10.03		0.60	32	-0.08	13.17		0.73	41	-0.13	6.92		0.72	21	-0.10	8.22	
BEO O2	0.71	56	-0.08	55.19		0.80	32	-0.07	29.17		0.82	44	-0.09	35.21		0.82	21	-0.07	18.05	
OSPW O3	0.59	71	-0.10	8.29		0.64	24	-0.09	8.44		0.74	46	-0.13	8.16		0.77	15	-0.11	7.23	
BEO O3	0.65	38	-0.04	54.62		0.72	24	-0.05	46.80		0.79	27	-0.06	31.60		0.78	15	-0.07	21.79	
OSPW O4	0.71	47	-0.09	7.99		0.64	10	-0.04	7.94		0.80	38	-0.10	6.51		0.86	5	-0.05	6.21	
BEO O4	0.62	26	-0.02	78.30		0.73	10	-0.02	92.57		0.82	18	-0.03	37.06		0.93	5	-0.03	25.79	
OSPW O5	0.55	22	-0.04	20.85		0.38	5	0.00	9.51		0.78	12	-0.05	27.04		0.64	2	0.00	13.75	
BEO O5	0.79	29	-0.05	54.59		0.81	5	-0.03	29.58		0.88	25	-0.05	21.54		0.92	2	-0.05	19.12	
OSPW O S	0.51	5	-0.22	4.55		0.48	4	-0.24	4.57		0.73	3	-0.29	3.30		0.77	2	-0.36	2.73	
BEO O S	0.62	13	-0.11	28.78		0.57	4	-0.18	4.96		0.75	8	-0.14	15.87		0.66	2	-0.23	3.45	
OSPW O2 S	0.78	14	-0.19	4.18		0.85	10	-0.18	4.29		0.83	12	-0.19	4.05		0.85	10	-0.18	4.29	
BEO O2 S	0.80	20	-0.17	4.74		0.83	10	-0.14	6.14		0.80	20	-0.17	4.74		0.83	10	-0.14	6.14	
OSPW O3 S	0.74	6	-0.14	3.91		0.83	3	-0.16	13.19		0.74	6	-0.14	3.91		0.87	2	-0.21	3.87	
BEO O3 S	0.70	10	-0.12	9.06		0.65	3	-0.15	17.69		0.83	7	-0.11	10.48		0.87	2	-0.06	19.76	
OSPW O4 S	0.82	2	-0.10	8.82		0.74	1	-0.15	4.78		0.82	2	-0.10	8.82		0.74	1	-0.15	4.78	
BEO O4 S	0.73	8	-0.06	18.43		0.90	1	-0.02	43.79		0.79	7	-0.08	14.34		0.90	1	-0.02	43.79	
OSPW ON	0.60	37	-0.11	9.44		0.68	29	-0.14	8.95		0.77	23	-0.16	4.23		0.79	18	-0.17	3.83	
BEO ON	0.63	48	-0.12	34.8		0.69	29	-0.16	7.35		0.73	36	-0.14	19.81		0.76	18	-0.20	6.24	
OSPW O2N	0.67	35	-0.07	13.2		0.71	27	-0.09	12.36		0.84	24	-0.07	11.5		0.86	19	-0.10	10.44	
BEO O2N	0.75	45	-0.62	30.3		0.74	27	-0.08	14.18		0.80	40	-0.06	27.53		0.79	19	-0.08	14.53	
OSPW O3N	0.42	14	-0.04	23.44		0.42	13	-0.04	23.86		0.66	6	-0.06	21.09		0.66	6	-0.06	21.10	
BEO O3N	0.79	30	-0.05	24.03		0.84	13	-0.07	18.65		0.85	27	-0.05	20.53		0.81	6	-0.06	16.01	

Table S8: Mean half-lives (in days) of O_x and O_xS species by carbon number and DBEs as measured in OSPW samples in APCI negative mode.

	DBE										
Carbon number		1	2	3	4	5	6	7	8	9	10
	6	18.50									
	7	18.84	12.48								
	8	12.78	31.45	26.91							
	9	23.49	81.12	68.12	12.86						
	10	35.07	451.45	15.49	4.80	8.26					
	11	25.63	34.47	6.29	1.76	4.41	4.14				
	12	22.99	37.06	59.69	4.10	3.40	10.29	2.31			
	13	81.34	6.44	5.13	4.65	9.99	6.67	47.44	53.48		
	14	60.11	13.00	9.02	4.90	4.39	11.96	2.42	4.12	7.21	
	15	175.68	13.43	3.94	3.67	3.04	4.01	7.05	3.06	29.14	
	16	19.08	11.30	5.44	4.92	2.70	9.87	4.48	5.63	3.82	
	17	20.05	18.03	3.8	9.62	5.19	5.22	71.67	1.78		
	18	31.10	15.93	13.97	8.01	4.08	2.98	3.50	2.23		
	19	10.58	4.56			23.89	12.61	5.79	4.61	5.45	
20	26.07	52.61				9.59	10.61	7.30	7.00	15.28	

Table S9: Mean half-lives (in days) of O_x and O_xS species by carbon number and DBEs as measured in OSPW samples in APCI positive mode.

	DBE													
Carbon number		1	2	3	4	5	6	7	8	9	10	11	12	13
	6	16.16	26.19											
	7	6.76	3.88	32.93										
	8	3.60	79.01	10.07	44.38									
	9	3.56	5.44	12.38	11.03	7.97								
	10	8.16	3.76	5.88	8.97	7.80	8.92							
	11		1.88	377.85	32.59	7.87	16.99	14.52						
	12		64.25	11.72	34.63	187.51	15.64	38.92	10.34					
	13		327.60	5.59	3.61	5.88	9.95	10.97	10.73	9.83				
	14	19.91		29.21	3.72	6.52	5.25	8.65	6.04	8.47	8.05			
	15			11.49	49.93	6.41	8.27	13.89	54.59	7.35	8.17	9.25		
	16			37.13	2.43	13.30	7.29	6.31	3.30	6.93	7.26	7.22	7.93	
	17		6.14		742.36	5.73	10.33	15.50	10.01	5.16	7.01	5.27	8.76	6.85
	18			13.00	14.92	3.08	6.66	3.63	2.91	3.79	2.37	3.75		6.87
	19						4.65	6.05	6.29	5.36	3.40			
	20		59.96				186.13				3.86			
	21										7.40			
	22									64.02				11.59
	26							10.48						
28							23.28							