

Appendix J: HACR1 and HAVO1 Trend Plots and Statistics

HACR1 Trend Plots and Statistics

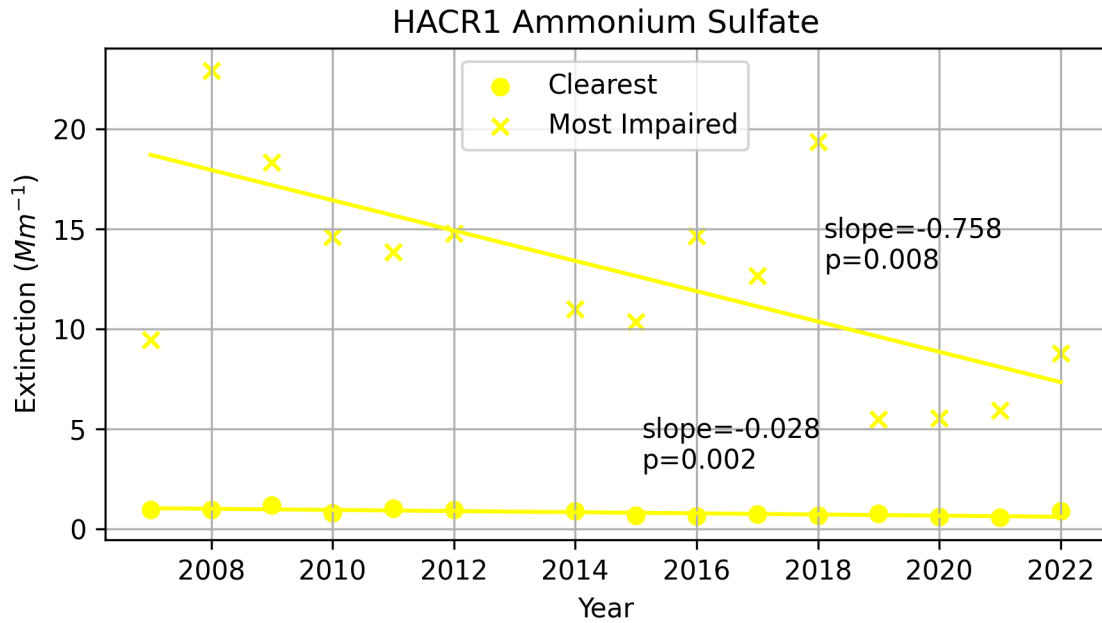


Figure D-1 HACR1 Ammonium Sulfate and Their Regression Line for the Clearest Days and Most Impaired Days

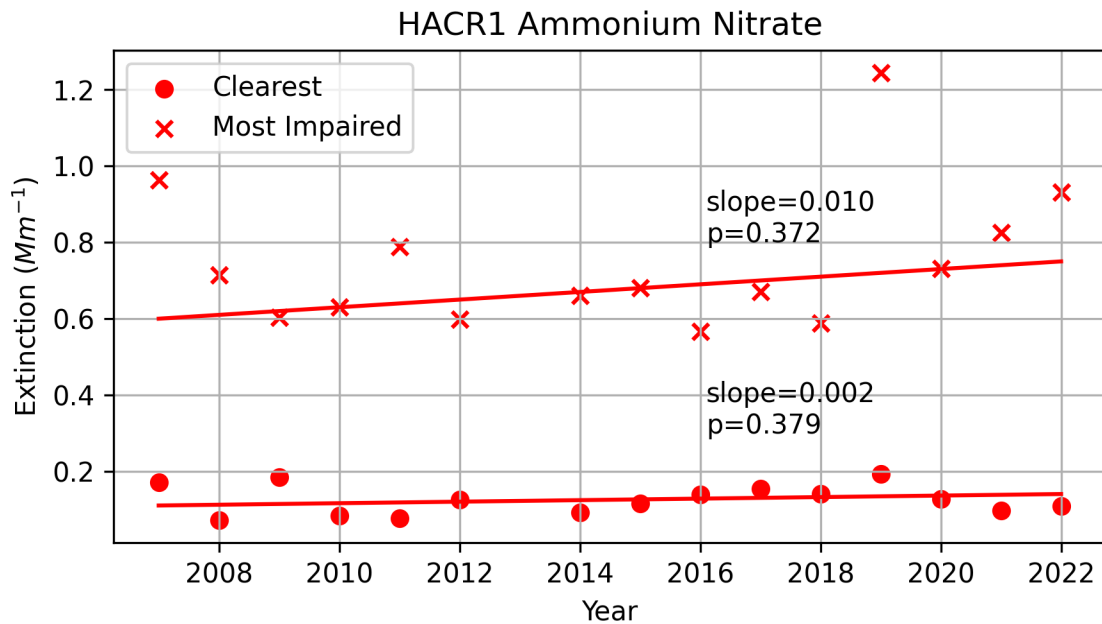


Figure D-2 HACR1 Ammonium Nitrate and Their Regression Line for the Clearest Days and Most Impaired Days

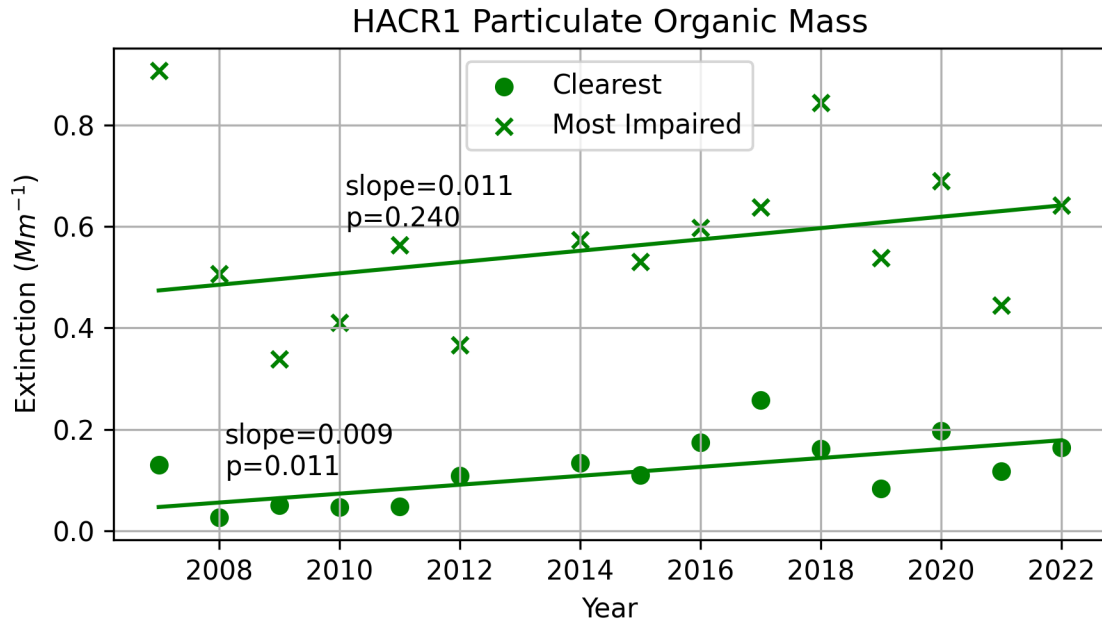


Figure D-3 HACR1 Particulate Organic Mass and Their Regression Line for the Clearest Days and the Most Impaired Days

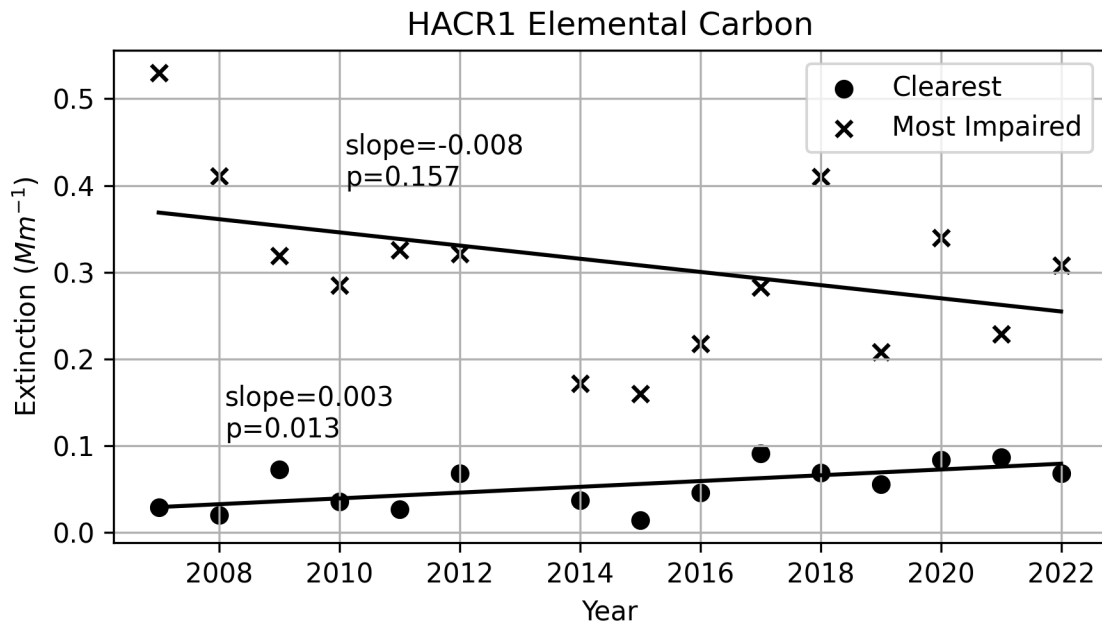


Figure D-4 HACR1 Elemental Carbon and Their Regression Line for the Clearest Days and Most Impaired Days

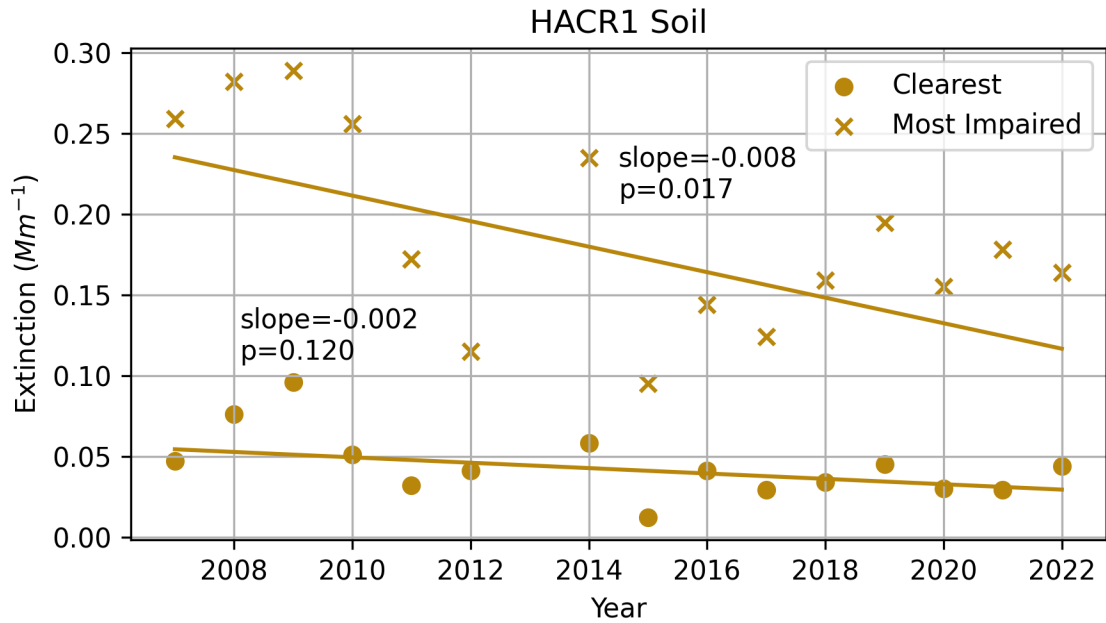


Figure D-5 HACR1 Soil and Theil Regression Line for the Clearest Days and Most Impaired Days

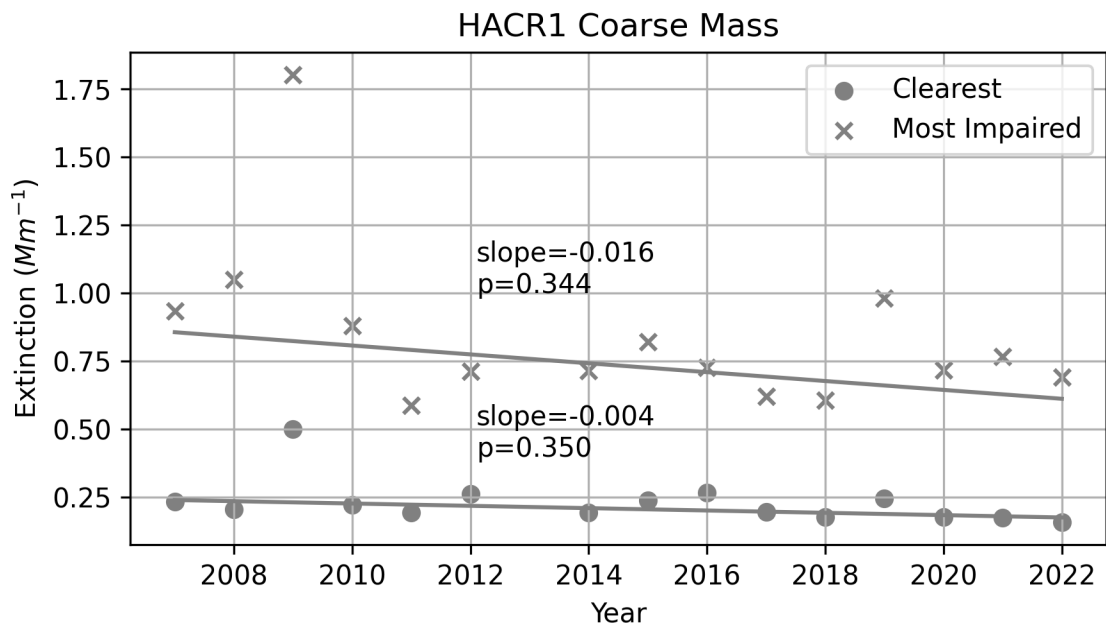


Figure D-6 HACR1 Coarse Mass and Theil Regression Line for the Clearest Days and Most Impaired Days

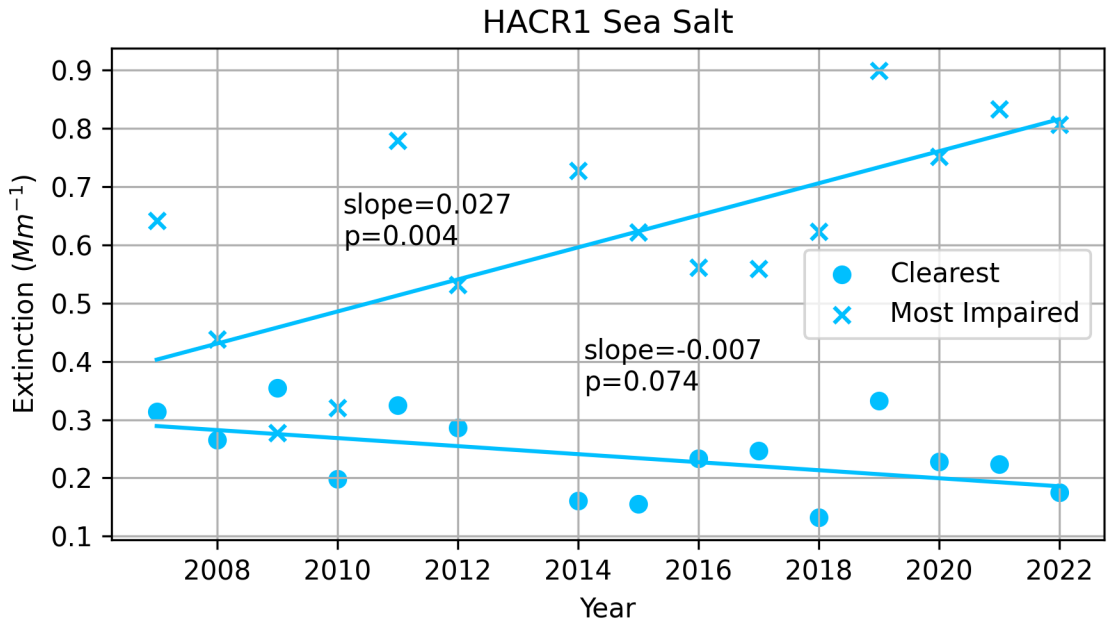


Figure D-7 HACR1 Coarse Mass and Their Regression Line for the Clearest Days and Most Impaired Days

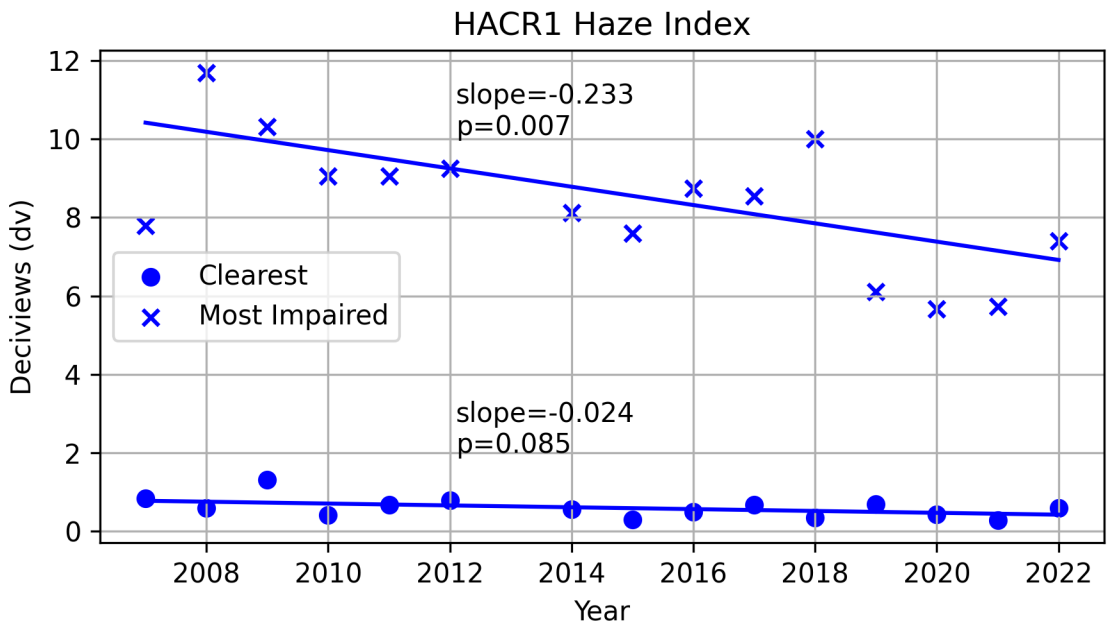


Figure D-8 HACR1 Coarse Mass and Their Regression Line for the Clearest Days and Most Impaired Days

Year	HACR1 (Median b_{ext} for Ammonium Sulfate)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.971	9.455
2008	0.964	22.921
2009	1.168	18.342
2010	0.804	14.599
2011	1.01	13.841
2012	0.964	14.766
2013	-	-
2014	0.907	10.985
2015	0.672	10.347
2016	0.631	14.638
2017	0.746	12.645
2018	0.656	19.352
2019	0.776	5.473
2020	0.611	5.545
2021	0.563	5.939
2022	0.907	8.792
Overall Median b_{ext} (Mm^{-1})	0.804	12.645
Trend/Theil Slope (Mm^{-1}/yr)	-0.028	-0.758
P-value	0.002	0.008
Intercept (Mm^{-1})	58.231	1540.016
Percent Change per Year (%/yr)	-2.8	-4.1

Table D-1 HACR1 b_{ext} for Ammonium Sulfate Statistics

Year	HACR1 (Median b_{ext} for Ammonium Nitrate)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.172	0.963
2008	0.072	0.715
2009	0.185	0.603
2010	0.084	0.630
2011	0.078	0.788
2012	0.127	0.598
2013	-	-
2014	0.093	0.661
2015	0.116	0.680
2016	0.139	0.566
2017	0.155	0.670
2018	0.142	0.589
2019	0.193	1.244
2020	0.128	0.731
2021	0.098	0.826
2022	0.109	0.931
Overall Median b_{ext} (Mm^{-1})	0.127	0.680
Trend/Theil Slope (Mm^{-1}/yr)	0.002	0.010
P-value	0.379	0.372
Intercept (Mm^{-1})	-3.903	-19.470
Percent Change per Year (%/yr)	+1.8	+1.7

Table D-2 HACR1 b_{ext} for Ammonium Nitrate Statistics

Year	HACR1 (Median b_{ext} for Particulate Organic Mass)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.130	0.907
2008	0.026	0.506
2009	0.050	0.339
2010	0.046	0.411
2011	0.048	0.563
2012	0.108	0.366
2013	-	-
2014	0.134	0.573
2015	0.110	0.531
2016	0.174	0.597
2017	0.258	0.638
2018	0.162	0.844
2019	0.083	0.538
2020	0.197	0.689
2021	0.117	0.445
2022	0.164	0.642
Overall Median b_{ext} (Mm^{-1})	0.117	0.563
Trend/Theil Slope (Mm^{-1}/yr)	0.009	0.011
P-value	0.011	0.240
Intercept (Mm^{-1})	-17.553	-21.938
Percent Change per Year (%/yr)	+18	+2.3

Table D-3 HACR1 b_{ext} for Particulate Organic Mass Statistics

Year	HACR1 (Median b_{ext} for Elemental Carbon)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.029	0.530
2008	0.020	0.411
2009	0.073	0.319
2010	0.036	0.285
2011	0.027	0.326
2012	0.068	0.321
2013	-	-
2014	0.037	0.172
2015	0.014	0.16
2016	0.046	0.218
2017	0.091	0.283
2018	0.069	0.41
2019	0.056	0.208
2020	0.084	0.34
2021	0.087	0.229
2022	0.068	0.308
Overall Median b_{ext} (Mm^{-1})	0.056	0.308
Trend/Theil Slope (Mm^{-1}/yr)	0.003	-0.008
P-value	0.013	0.157
Intercept (Mm^{-1})	-6.661	15.622
Percent Change per Year (%/yr)	+11	-2.1

Table D-4 HACR1 b_{ext} for Elemental Carbon Statistics

Year	HACR1 (Median b_{ext} for Soil)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.047	0.259
2008	0.076	0.282
2009	0.096	0.289
2010	0.051	0.256
2011	0.032	0.172
2012	0.041	0.115
2013	-	-
2014	0.058	0.235
2015	0.012	0.095
2016	0.041	0.144
2017	0.029	0.124
2018	0.034	0.159
2019	0.045	0.195
2020	0.030	0.155
2021	0.029	0.178
2022	0.044	0.164
Overall Median b_{ext} (Mm^{-1})	0.041	0.172
Trend/Theil Slope (Mm^{-1}/yr)	-0.002	-0.008
P-value	0.120	0.017
Intercept (Mm^{-1})	3.399	16.109
Percent Change per Year (%/yr)	-3.1	-2.1

Table D-5 HACR1 b_{ext} for Soil Statistics

Year	HACR1 (Median b_{ext} for Coarse Mass)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.233	0.934
2008	0.206	1.049
2009	0.500	1.802
2010	0.223	0.881
2011	0.194	0.588
2012	0.262	0.712
2013	-	-
2014	0.195	0.716
2015	0.238	0.821
2016	0.267	0.726
2017	0.196	0.620
2018	0.177	0.607
2019	0.246	0.981
2020	0.178	0.718
2021	0.176	0.766
2022	0.158	0.692
Overall Median b_{ext} (Mm^{-1})	0.206	0.726
Trend/Theil Slope (Mm^{-1}/yr)	-0.004	-0.016
P-value	0.350	0.344
Intercept (Mm^{-1})	8.816	33.570
Percent Change per Year (%/yr)	-1.8	-1.9

Table D-6 HACR1 b_{ext} for Coarse Mass Statistics

Year	HACR1 (Median b_{ext} for Sea Salt)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2007	0.314	0.642
2008	0.265	0.438
2009	0.355	0.277
2010	0.198	0.32
2011	0.325	0.779
2012	0.286	0.531
2013	-	-
2014	0.161	0.727
2015	0.155	0.622
2016	0.234	0.561
2017	0.247	0.559
2018	0.132	0.623
2019	0.333	0.899
2020	0.228	0.751
2021	0.224	0.833
2022	0.175	0.807
Overall Median b_{ext} (Mm^{-1})	0.234	0.623
Trend/Theil Slope (Mm^{-1}/yr)	-0.007	0.028
P-value	0.074	0.004
Intercept (Mm^{-1})	14.115	-54.789
Percent Change per Year (%/yr)	-2.4	6.8

Table D-7 HACR1 b_{ext} for Sea Salt Statistics

Year	HACR1 (Median for Haze Index)	
	Clearest Days (dv)	Most Impaired Days (dv)
2007	0.846	7.795
2008	0.595	11.689
2009	1.312	10.317
2010	0.419	9.049
2011	0.676	9.05
2012	0.8	9.252
2013	-	-
2014	0.557	8.116
2015	0.3	7.59
2016	0.503	8.743
2017	0.682	8.55
2018	0.357	9.997
2019	0.693	6.107
2020	0.431	5.672
2021	0.28	5.725
2022	0.591	7.393
Overall Median Haze Index (dv)	0.591	8.550
Trend/Theil Slope (dv/yr)	-0.024	-0.233
P-value	0.085	0.008
Intercept (dv)	48.145	478.549
Percent Change per Year (%/yr)	-3.0	-2.2

Table D-8 HACR1 Haze Index Statistics

HAVO1 Trend Plots and Statistics

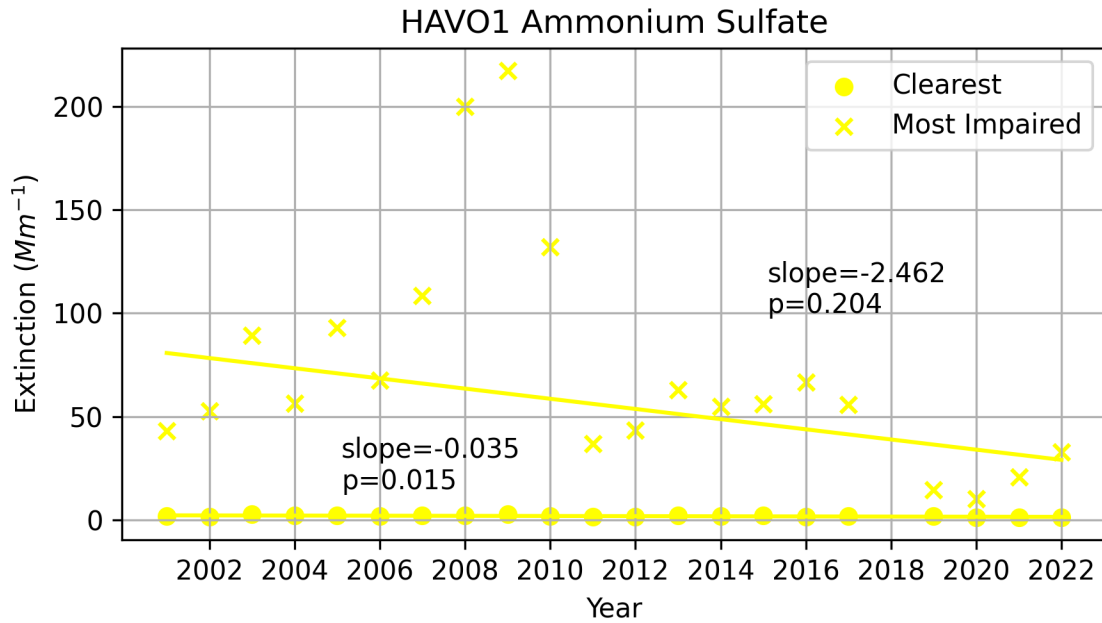


Figure D-9 HAVO1 Ammonium Sulfate and Their Regression Line for the Clearest Days and Most Impaired Days

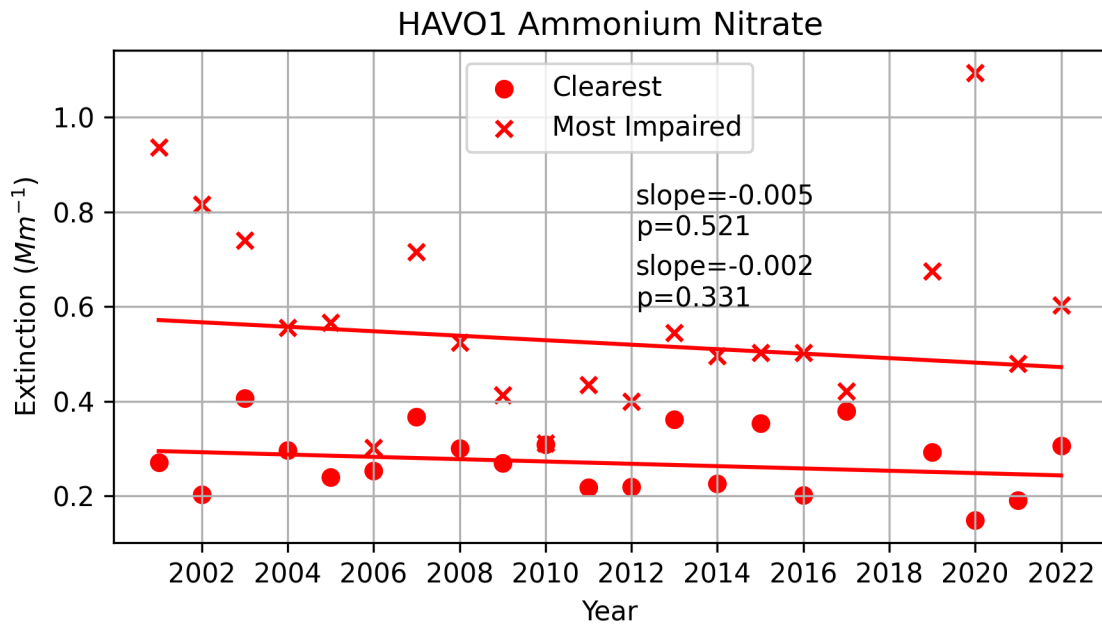


Figure D-10 HAVO1 Ammonium Nitrate and Their Regression Line for the Clearest Days and Most Impaired Days

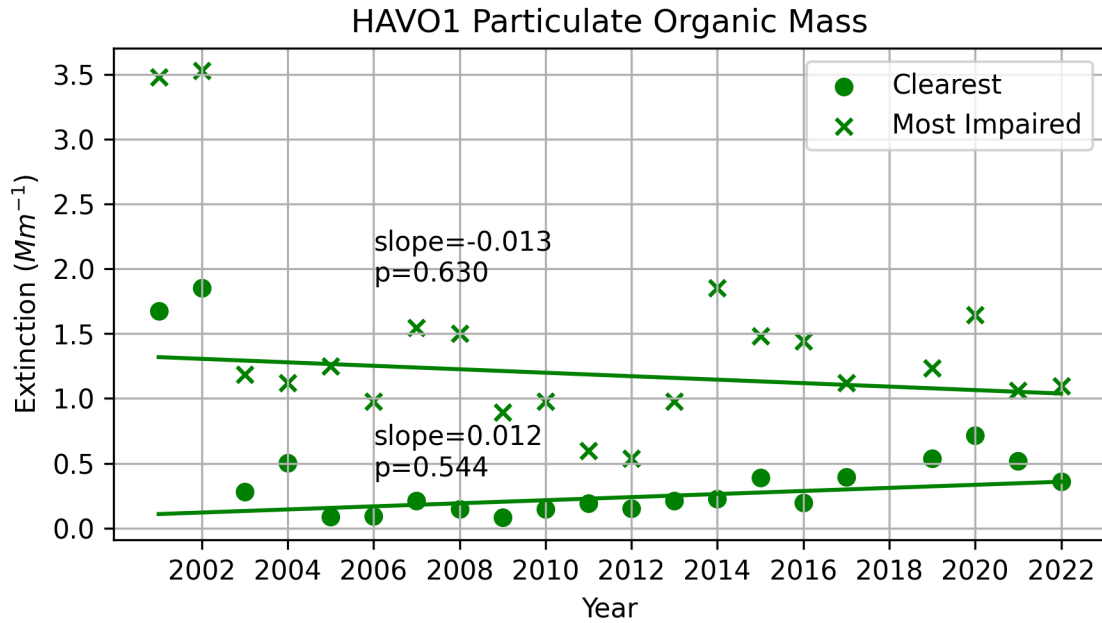


Figure D-11 HAVO1 Particulate Organic Mass and Their Regression Line for the Clearest Days and Most Impaired Days

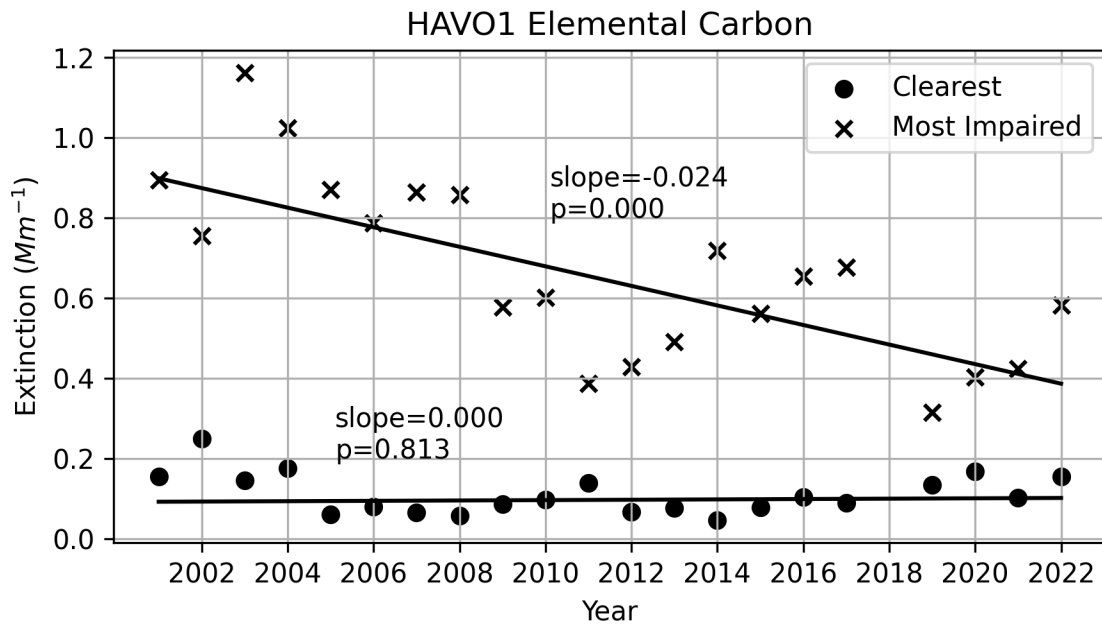


Figure D-12 HAVO1 Elemental Carbon and Their Regression Line for the Clearest Days and Most Impaired Days

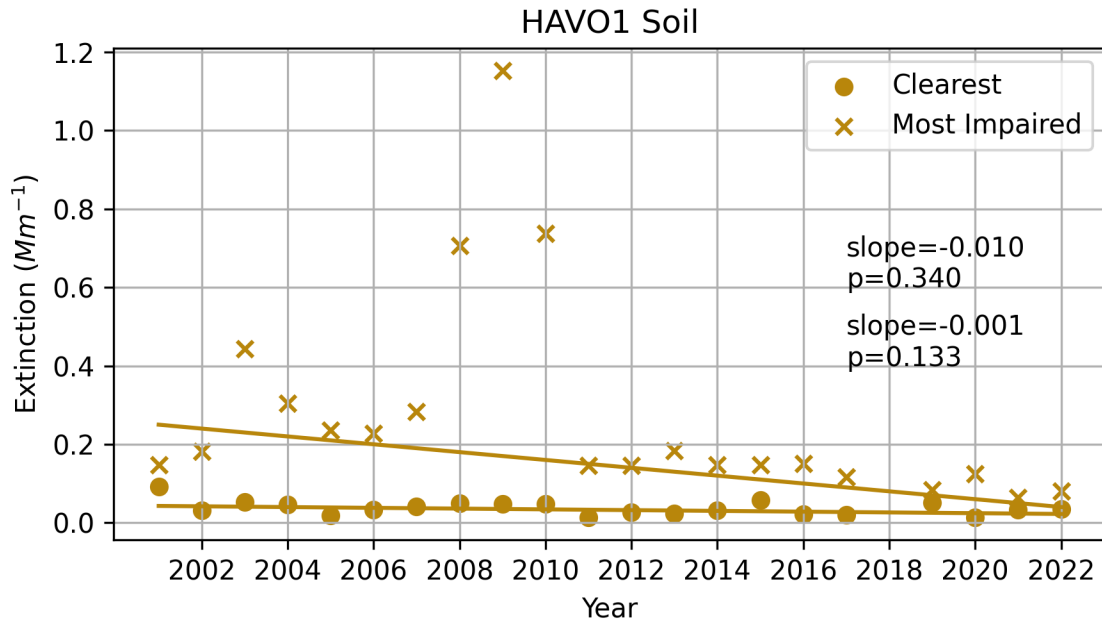


Figure D-13 HAVO1 Soil and Theil Regression Line for the Clearest Days and Most Impaired Days

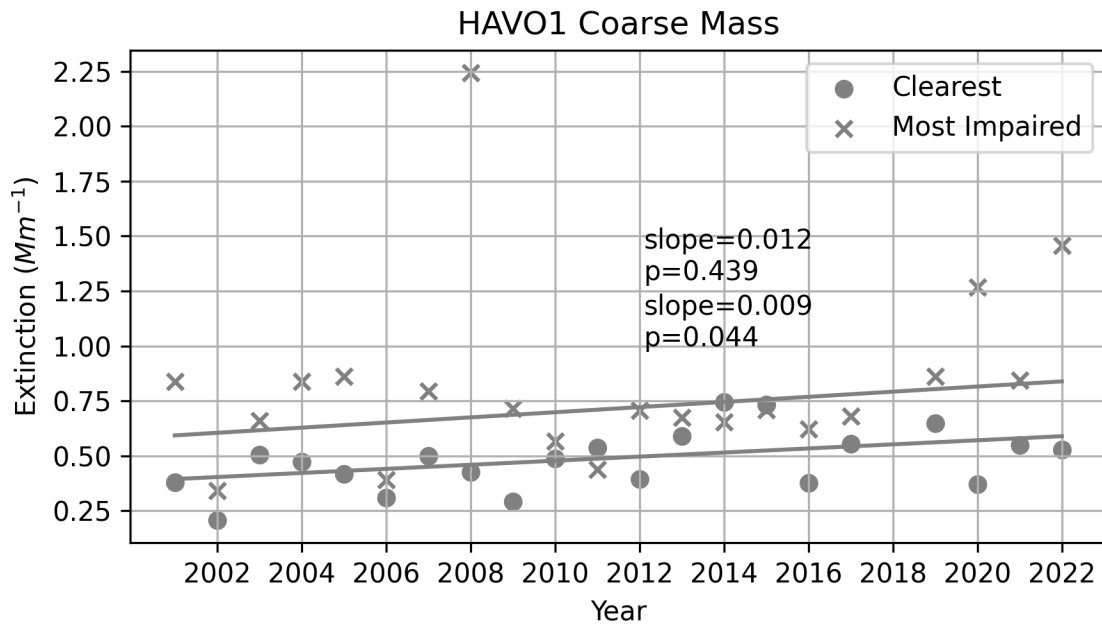


Figure D-14 HAVO1 Coarse Mass and Theil Regression Line for the Clearest Days and Most Impaired Days

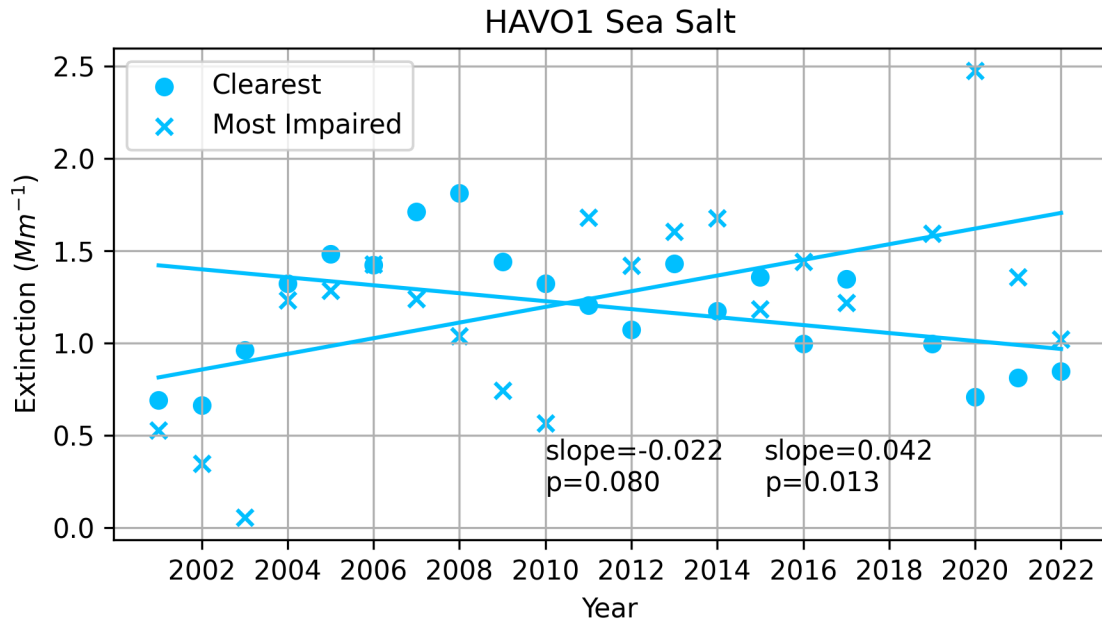


Figure D-15 HAVO1 Sea Salt and Their Regression Line for the Clearest Days and Most Impaired Days

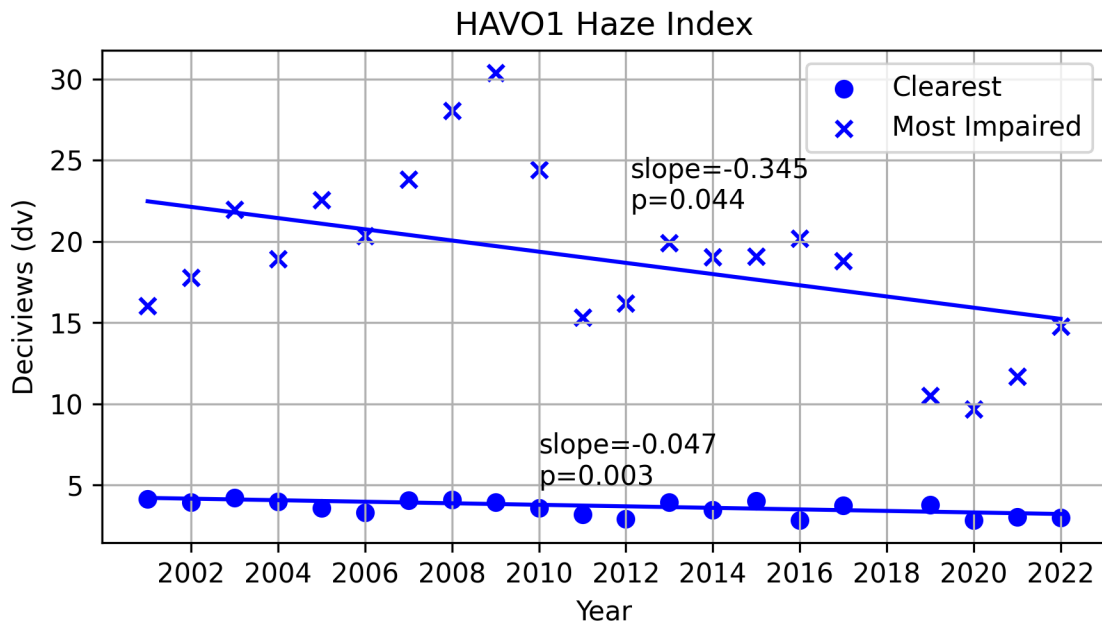


Figure D-16 HAVO1 Haze Index and Their Regression Line for the Clearest Days and Most Impaired Days

Year	HAVO1 (Median b_{ext} for Ammonium Sulfate)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	1.885	43.081
2002	1.669	52.675
2003	2.931	89.204
2004	2.136	56.318
2005	2.074	93.144
2006	1.766	67.607
2007	2.165	108.613
2008	2.286	199.983
2009	2.665	217.356
2010	1.958	132.067
2011	1.501	36.824
2012	1.507	43.417
2013	2.188	62.807
2014	1.738	54.733
2015	2.048	56.159
2016	1.417	66.519
2017	1.818	55.679
2018	-	-
2019	1.968	14.715
2020	1.149	10.155
2021	1.348	20.893
2022	1.279	32.87
Overall Median b_{ext} (Mm^{-1})	1.885	56.159
Trend/Theil Slope (Mm^{-1}/yr)	-0.035	-2.462
P-value	0.015	0.204
Intercept (Mm^{-1})	71.868	5006.358
Percent Change per Year based on Trend (%/yr)	-1.6	-3.0

Table D-9 HAVO1 b_{ext} for Ammonium Sulfate Statistics

Year	HAVO1 (Median b_{ext} for Ammonium Nitrate)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	0.270	0.936
2002	0.202	0.816
2003	0.406	0.740
2004	0.296	0.556
2005	0.239	0.566
2006	0.253	0.302
2007	0.367	0.716
2008	0.300	0.524
2009	0.269	0.413
2010	0.309	0.311
2011	0.217	0.435
2012	0.219	0.400
2013	0.361	0.544
2014	0.226	0.496
2015	0.353	0.502
2016	0.201	0.503
2017	0.379	0.421
2018	-	-
2019	0.292	0.675
2020	0.148	1.094
2021	0.190	0.479
2022	0.306	0.603
Overall Median b_{ext} (Mm^{-1})	0.270	0.524
Trend/Theil Slope (Mm^{-1}/yr)	-0.002	-0.005
P-value	0.331	0.521
Intercept (Mm^{-1})	5.197	10.042
Percent Change per Year based on Trend (%/yr)	-0.8	-0.8

Table D-10 HAVO1 b_{ext} for Ammonium Nitrate Statistics

Year	HAVO1 (Median b_{ext} for Particulate Organic Mass)	
	Clearer Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	1.674	3.481
2002	1.854	3.529
2003	0.279	1.185
2004	0.504	1.121
2005	0.087	1.249
2006	0.093	0.975
2007	0.21	1.544
2008	0.145	1.499
2009	0.081	0.891
2010	0.147	0.979
2011	0.19	0.599
2012	0.151	0.538
2013	0.21	0.975
2014	0.227	1.852
2015	0.389	1.482
2016	0.198	1.44
2017	0.395	1.121
2018	-	-
2019	0.536	1.236
2020	0.717	1.646
2021	0.517	1.061
2022	0.36	1.098
Overall Median b_{ext} (Mm^{-1})	0.227	1.185
Trend/Theil Slope (Mm^{-1}/yr)	0.012	-0.013
P-value	0.544	0.630
Intercept (Mm^{-1})	-23.654	28.082
Percent Change per Year based on Trend (%/yr)	+11	-1.0

Table D-11 HAVO1 b_{ext} for Particulate Organic Mass Statistics

Year	HAVO1 (Median b_{ext} for Elemental Carbon)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	0.156	0.895
2002	0.250	0.756
2003	0.145	1.162
2004	0.176	1.024
2005	0.061	0.870
2006	0.080	0.788
2007	0.066	0.864
2008	0.057	0.857
2009	0.086	0.577
2010	0.097	0.601
2011	0.139	0.388
2012	0.067	0.429
2013	0.077	0.492
2014	0.046	0.719
2015	0.079	0.562
2016	0.104	0.655
2017	0.089	0.677
2018	-	-
2019	0.134	0.315
2020	0.168	0.403
2021	0.103	0.424
2022	0.155	0.583
Overall Median b_{ext} (Mm^{-1})	0.097	0.655
Trend/Theil Slope (Mm^{-1}/yr)	0.000	-0.024
P-value	0.044	0.439
Intercept (Mm^{-1})	-0.809	49.690
Percent Change per Year based on Trend (%/yr)	+0.5	-2.7

Table D-12 HAVO1 b_{ext} for Elemental Carbon Statistics

Year	HAVO1 (Median b_{ext} for Soil)	
	Clearer Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	0.092	0.147
2002	0.031	0.182
2003	0.052	0.443
2004	0.046	0.304
2005	0.018	0.236
2006	0.033	0.227
2007	0.041	0.284
2008	0.049	0.706
2009	0.048	1.153
2010	0.048	0.737
2011	0.013	0.146
2012	0.026	0.146
2013	0.023	0.184
2014	0.031	0.147
2015	0.058	0.147
2016	0.022	0.150
2017	0.020	0.116
2018	-	-
2019	0.051	0.084
2020	0.014	0.125
2021	0.033	0.064
2022	0.034	0.08
Overall Median b_{ext} (Mm^{-1})	0.033	0.150
Trend/Theil Slope (Mm^{-1}/yr)	-0.001	-0.010
P-value	0.133	0.340
Intercept (Mm^{-1})	1.991	20.260
Percent Change per Year based on Trend (%/yr)	-2.3	-4

Table D-13 HAVO1 b_{ext} for Soil Statistics

Year	HAVO1 (Median b_{ext} for Coarse Mass)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	0.380	0.839
2002	0.206	0.341
2003	0.504	0.660
2004	0.473	0.838
2005	0.416	0.860
2006	0.310	0.392
2007	0.499	0.795
2008	0.427	2.244
2009	0.293	0.714
2010	0.487	0.565
2011	0.538	0.437
2012	0.393	0.706
2013	0.590	0.674
2014	0.745	0.655
2015	0.734	0.710
2016	0.377	0.622
2017	0.556	0.679
2018	-	-
2019	0.648	0.860
2020	0.371	1.267
2021	0.548	0.845
2022	0.527	1.458
Overall Median b_{ext} (Mm^{-1})	0.487	0.710
Trend/Theil Slope (Mm^{-1}/yr)	0.009	0.012
P-value	0.044	0.439
Intercept (Mm^{-1})	-18.209	-22.835
Percent Change per Year based on Trend (%/yr)	+2.4	+2.0

Table D-14 HAVO1 b_{ext} for Coarse Mass Statistics

Year	HAVO1 (Median b_{ext} for Sea Salt)	
	Clearest Days (Mm^{-1})	Most Impaired Days (Mm^{-1})
2001	0.692	0.527
2002	0.664	0.348
2003	0.960	0.055
2004	1.323	1.232
2005	1.483	1.285
2006	1.423	1.428
2007	1.711	1.238
2008	1.813	1.038
2009	1.441	0.743
2010	1.323	0.567
2011	1.205	1.681
2012	1.073	1.421
2013	1.431	1.605
2014	1.172	1.676
2015	1.358	1.184
2016	0.998	1.439
2017	1.346	1.220
2018	-	-
2019	0.995	1.593
2020	0.707	2.475
2021	0.811	1.357
2022	0.846	1.022
Overall Median b_{ext} (Mm^{-1})	1.205	1.238
Trend/Theil Slope (Mm^{-1}/yr)	-0.022	0.042
P-value	0.080	0.013
Intercept (Mm^{-1})	44.559	-84.041
Percent Change per Year based on Trend (%/yr)	-1.5	+5.2

Table D-15 HAVO1 b_{ext} for Sea Salt Statistics

Year	HAVO1 (Median for Haze Index)	
	Clearest Days (dv)	Most Impaired Days (dv)
2001	4.140	16.022
2002	3.936	17.765
2003	4.206	21.948
2004	3.962	18.923
2005	3.580	22.567
2006	3.284	20.327
2007	4.044	23.811
2008	4.071	28.059
2009	3.915	30.398
2010	3.593	24.435
2011	3.180	15.331
2012	2.909	16.174
2013	3.914	19.920
2014	3.454	19.024
2015	3.999	19.092
2016	2.815	20.188
2017	3.724	18.805
2018	-	-
2019	3.764	10.485
2020	2.810	9.672
2021	3.009	11.663
2022	2.961	14.785
Overall Median Haze Index (dv)	3.724	19.024
Trend/Theil Slope (dv/yr)	-0.047	-0.345
P-value	0.003	0.044
Intercept (dv)	98.643	712.819
Percent Change per Year based on Trend (%/yr)	-1.1	-1.5

Table D-16 HAVO1 Haze Index Statistics

HACR1 All Days Trend Plots and Statistics

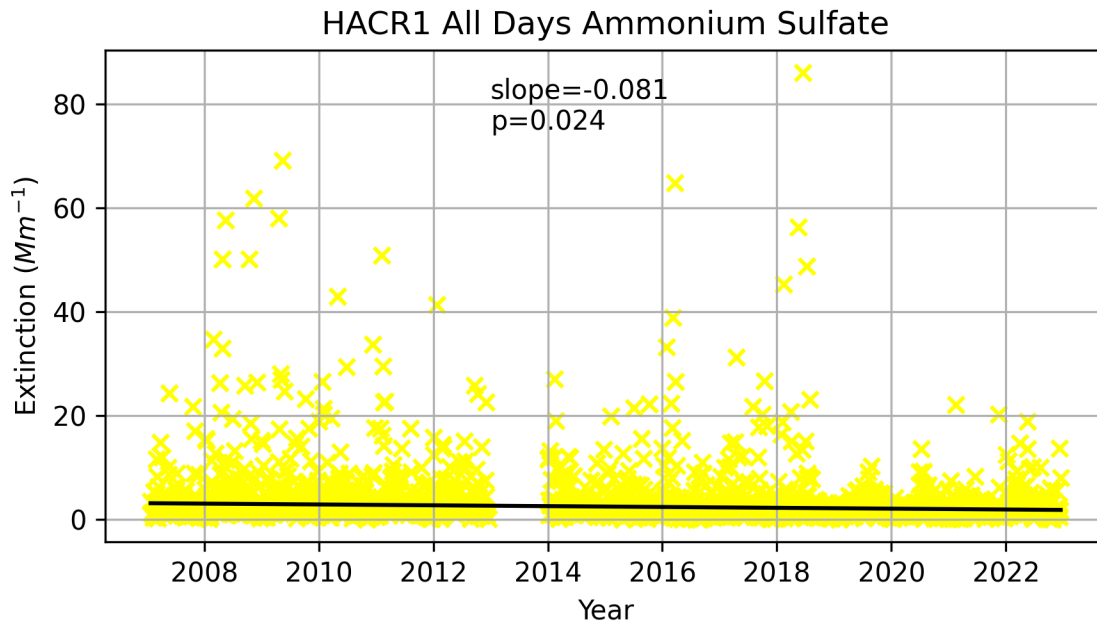


Figure D-17 HACR1 Ammonium Sulfate and Their Regression Line for All Days

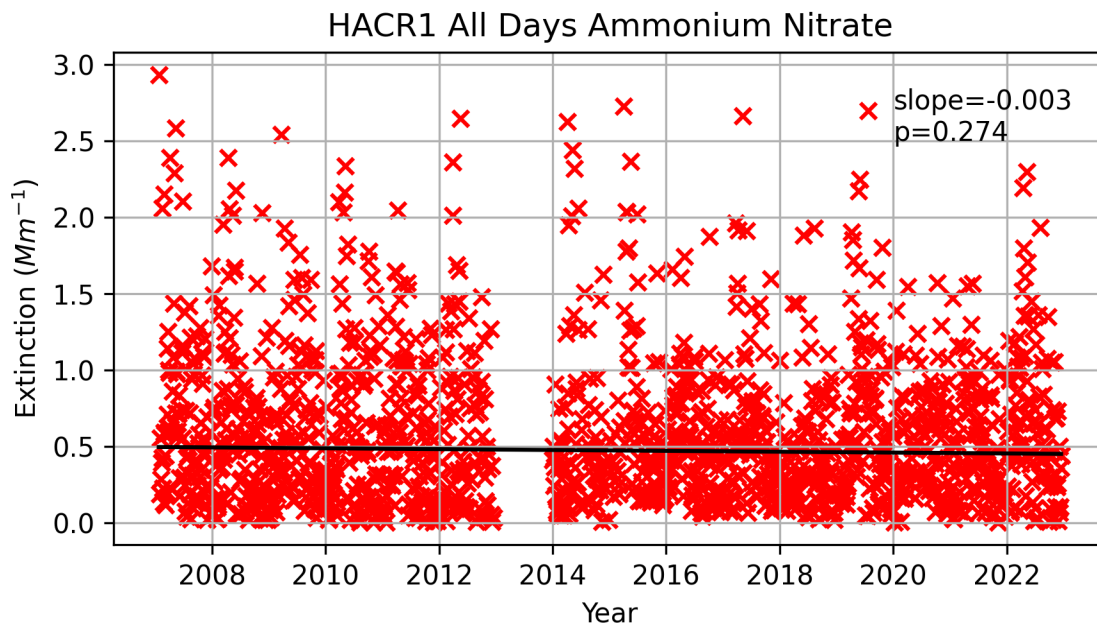


Figure D-18 HACR1 Ammonium Nitrate and Their Regression Line for All Days

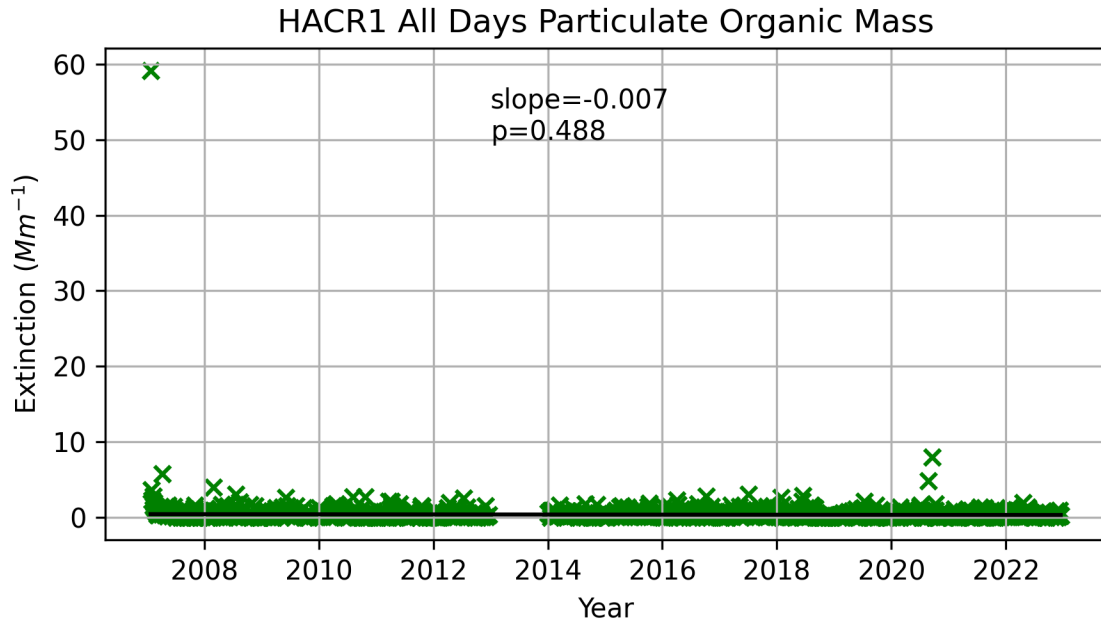


Figure D-19 HACR1 Particulate Organic Mass and Their Regression Line for All Days

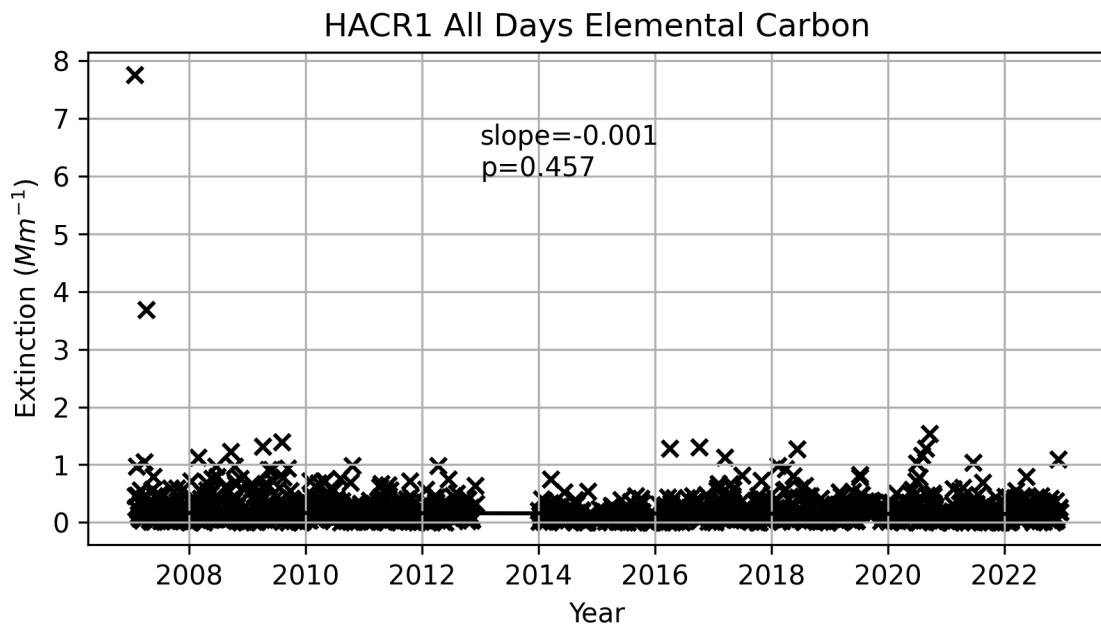


Figure D-20 HACR1 Elemental Carbon and Their Regression Line for All Days

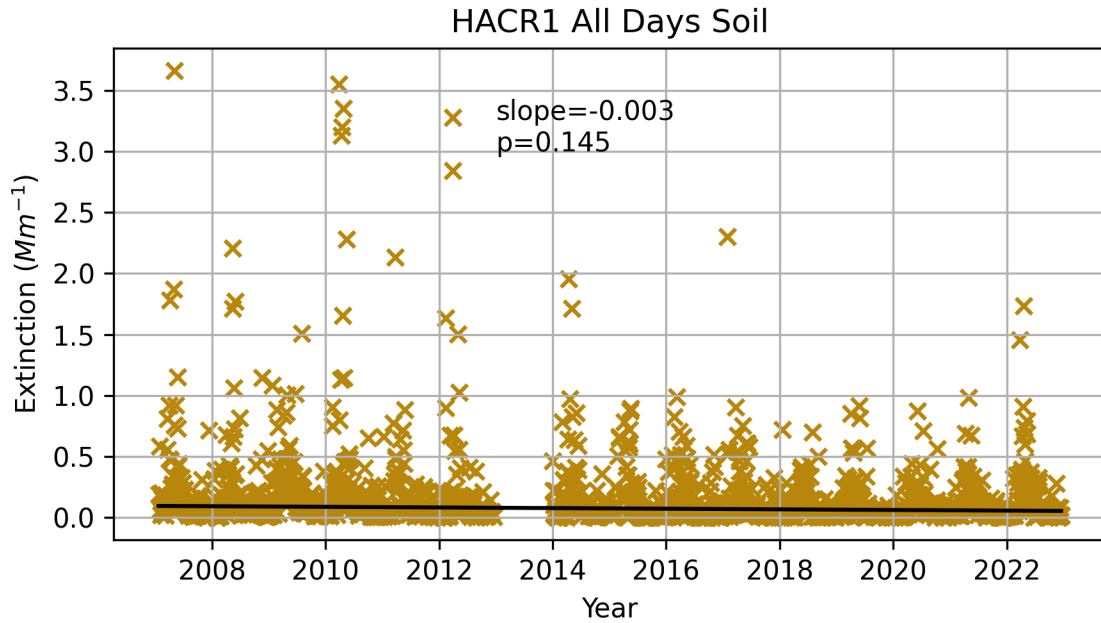


Figure D-21 HACR1 Soil and Their Regression Line for All Days

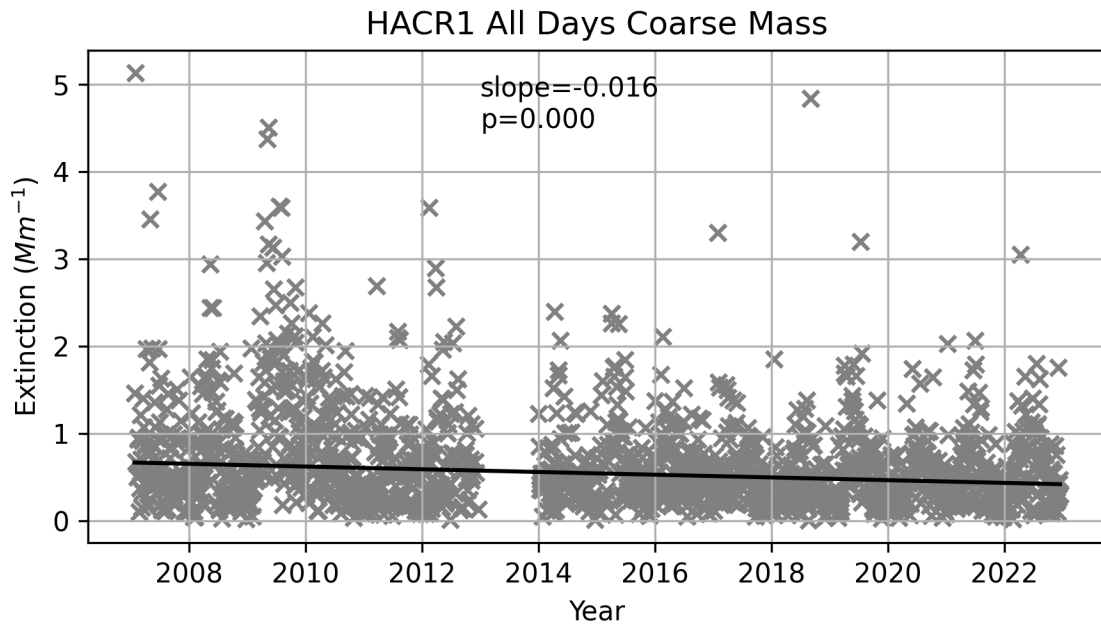


Figure D-22 HACR1 Coarse Mass and Their Regression Line for All Days

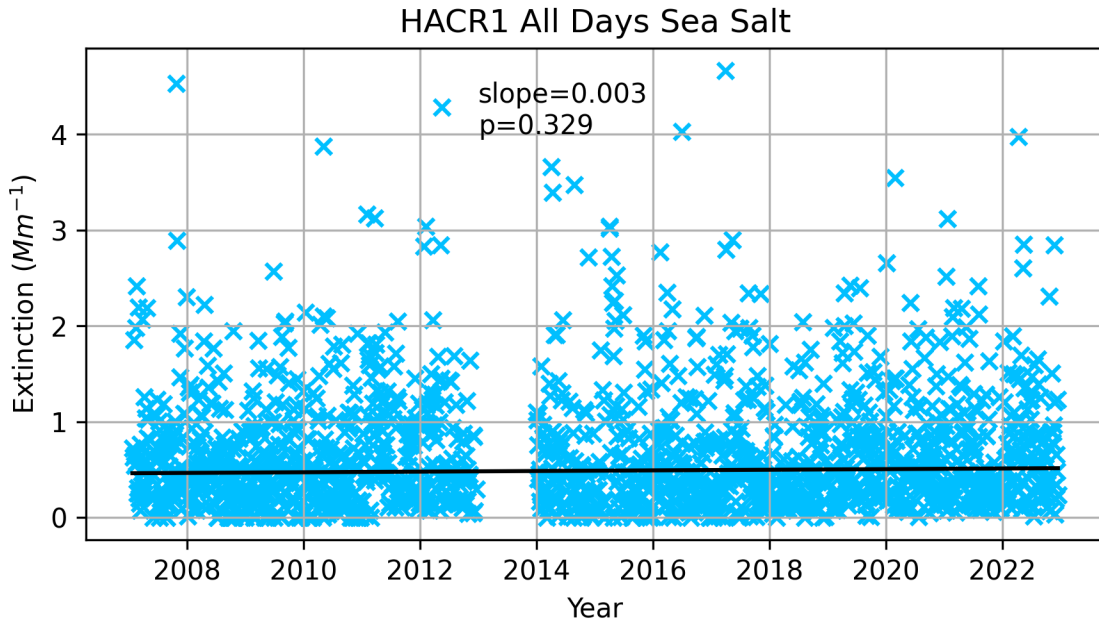


Figure D-23 HACR1 Sea Salt and Their Regression Line for All Days

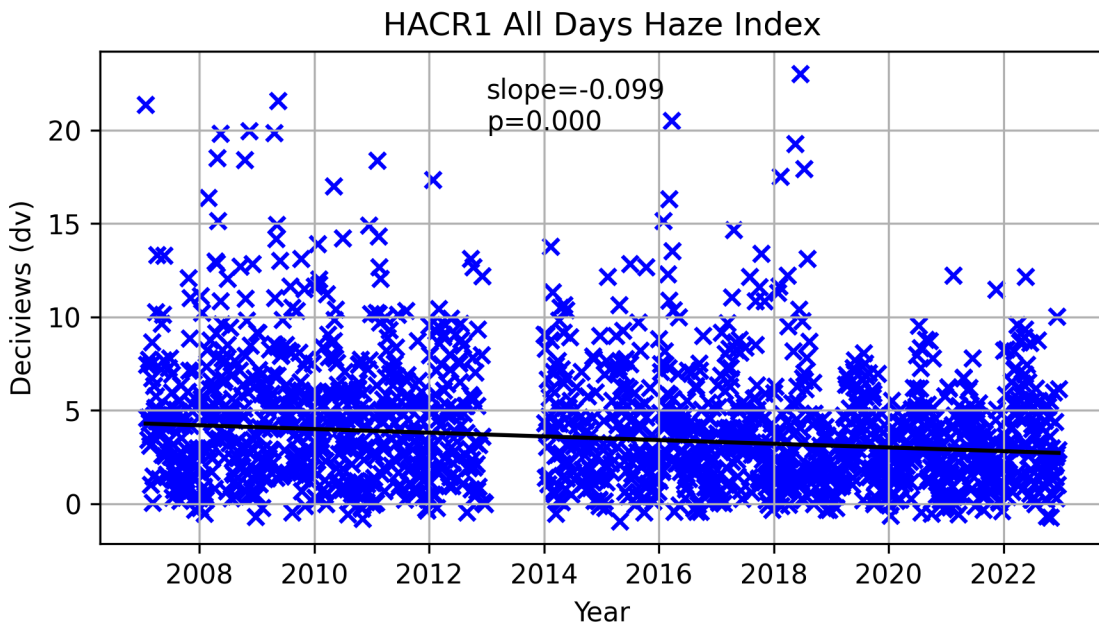


Figure D-24 HACR1 Haze Index and Their Regression Line for All Days

	Ammonium Sulfate	Ammonium Nitrate	POM	EC	Soil	CM	Sea Salt
Overall Median b_{ext} (Mm^{-1})	2.478	0.470	0.391	0.156	0.075	0.532	0.492
Trend/Theil Slope (Mm^{-1}/yr)	-0.081	-0.003	-0.007	-0.001	-0.003	-0.016	0.003
P-value	0.024	0.274	0.488	0.457	0.145	0.000	0.329
Intercept (Mm^{-1})	165.493	6.169	14.672	2.819	5.215	31.974	-6.126
Percent Change per Year based on Trend (%/yr)	-2.6	-0.6	-1.6	-0.8	-2.6	-2.3	+0.7

Table D-17 HACR1 Aerosol Species Statistics for All Days

Overall Median Haze Index (dv)	3.441
Trend/Theil Slope (dv/yr)	-0.099
P-value	0.000
Intercept (dv)	202.761
Percent Change per Year based on Trend (%/yr)	-2.3

Table D-18 HACR1 Haze Index Statistics for All Days

HAVO1 All Days Trend Plots and Statistics

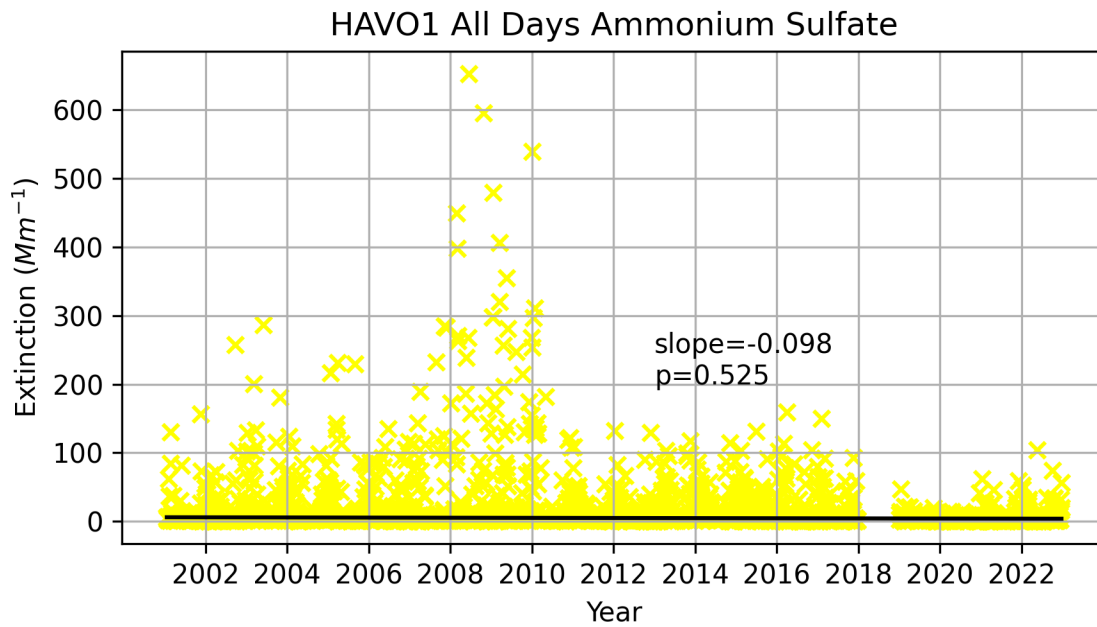


Figure D-25 HAVO1 Ammonium Sulfate and Their Regression Line for All Days

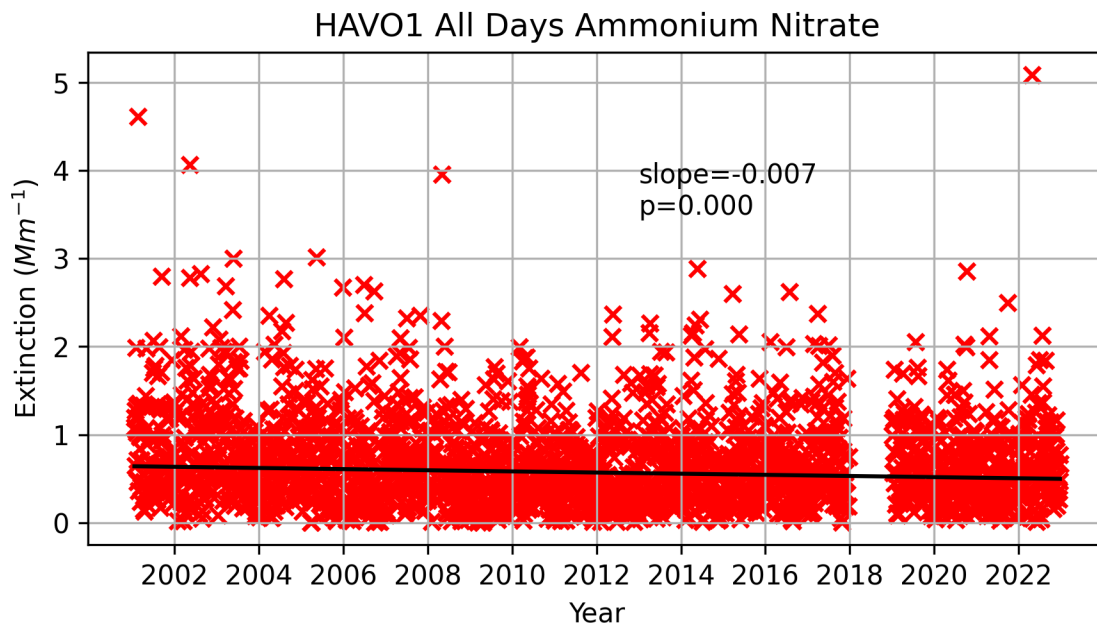


Figure D-26 HAVO1 Ammonium Nitrate and Their Regression Line for All Days

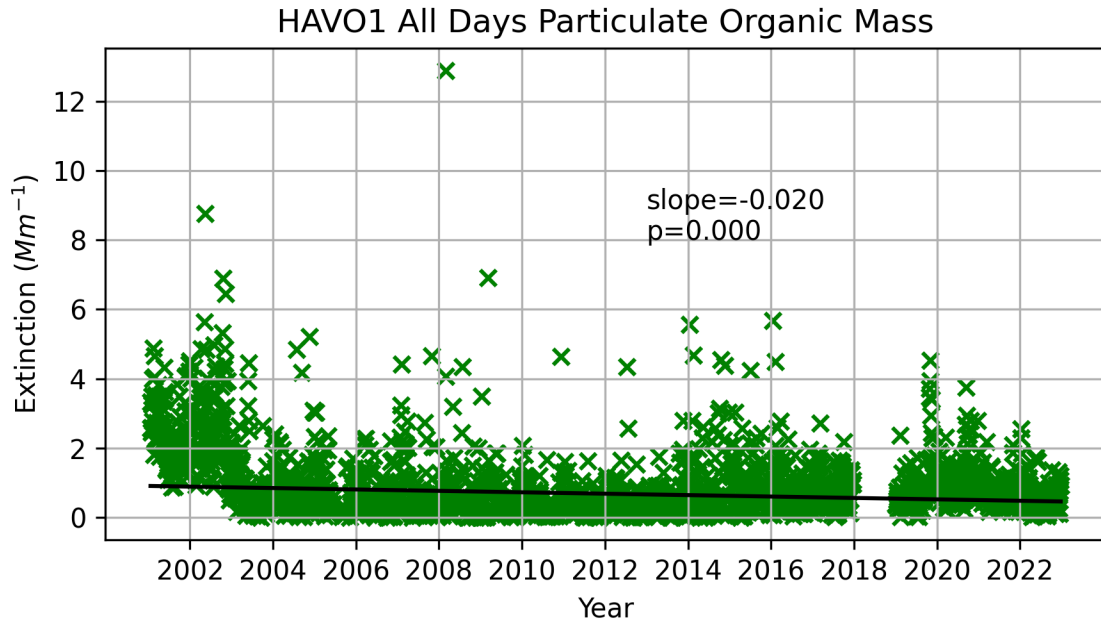


Figure D-27 HAVO1 Particulate Organic Mass and Their Regression Line for All Days

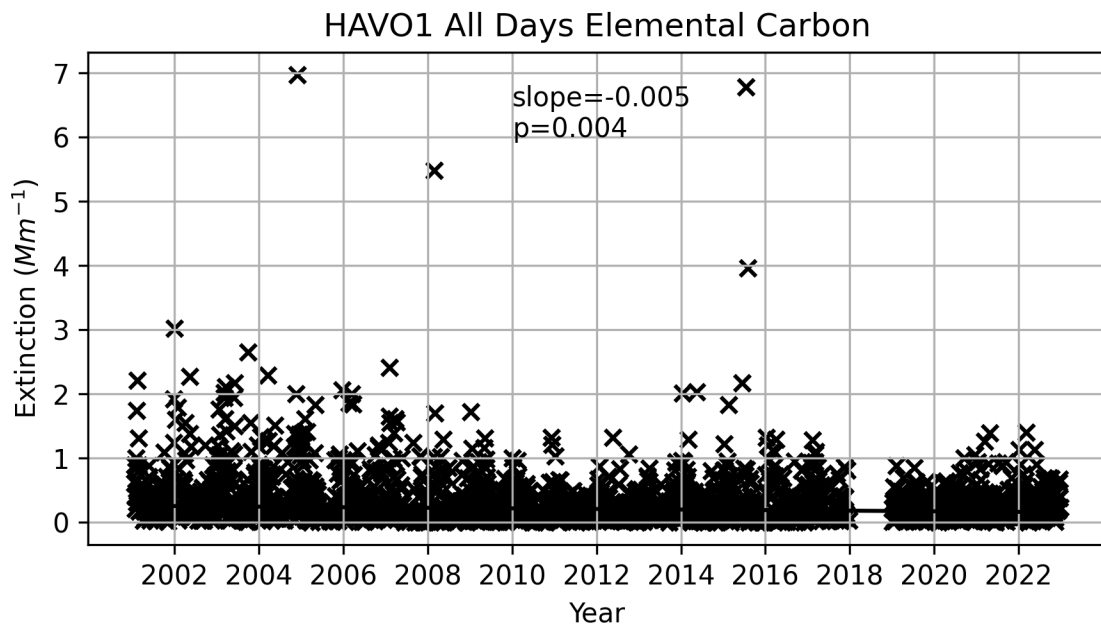


Figure D-28 HAVO1 Elemental Carbon and Their Regression Line for All Days

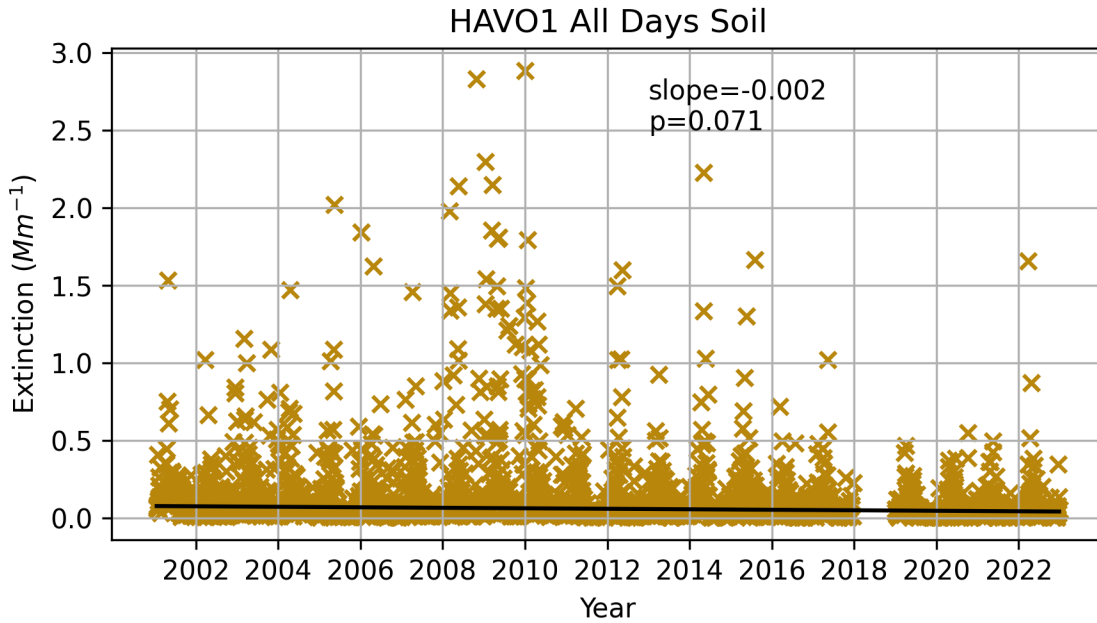


Figure D-29 HAVO1 Soil and Their Regression Line for All Days

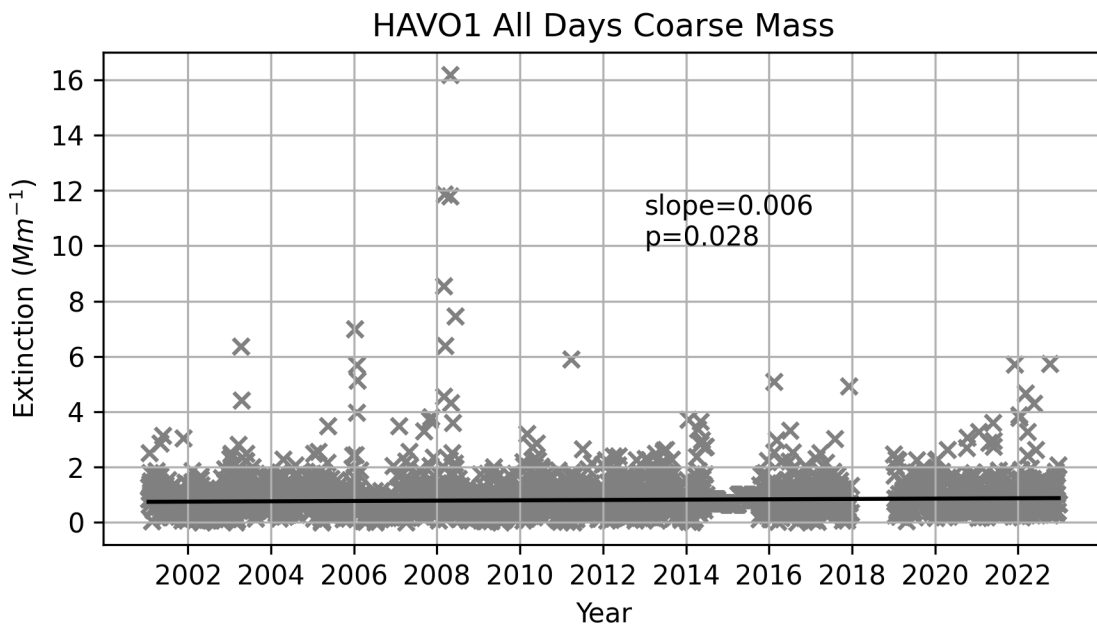


Figure D-30 HAVO1 Coarse Mass and Their Regression Line for All Days

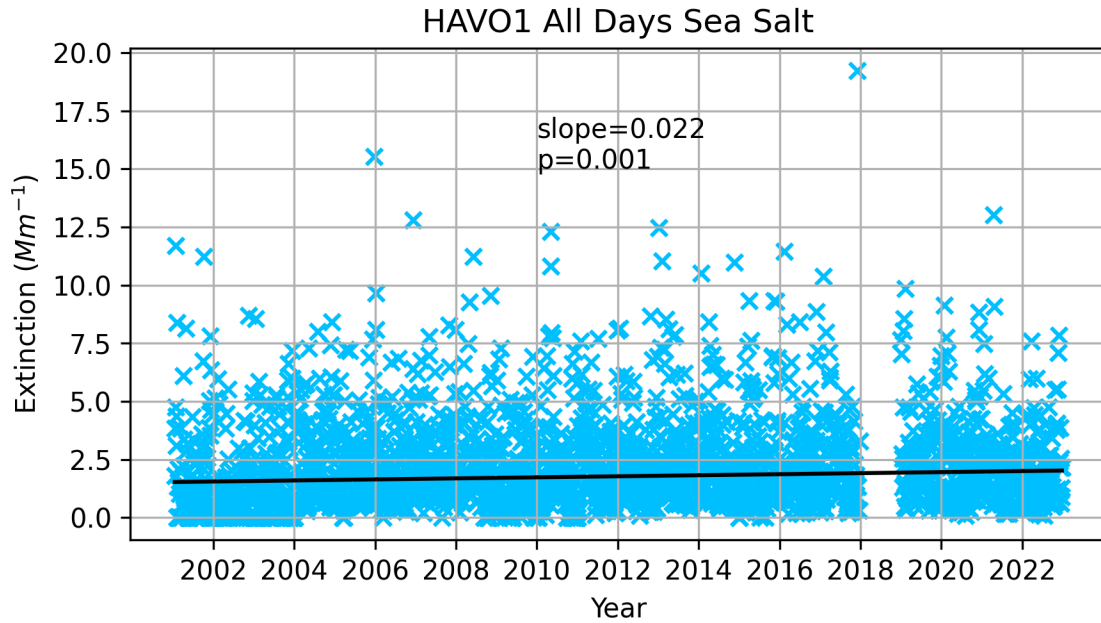


Figure D-31 HAVO1 Sea Salt and Their Regression Line for All Days

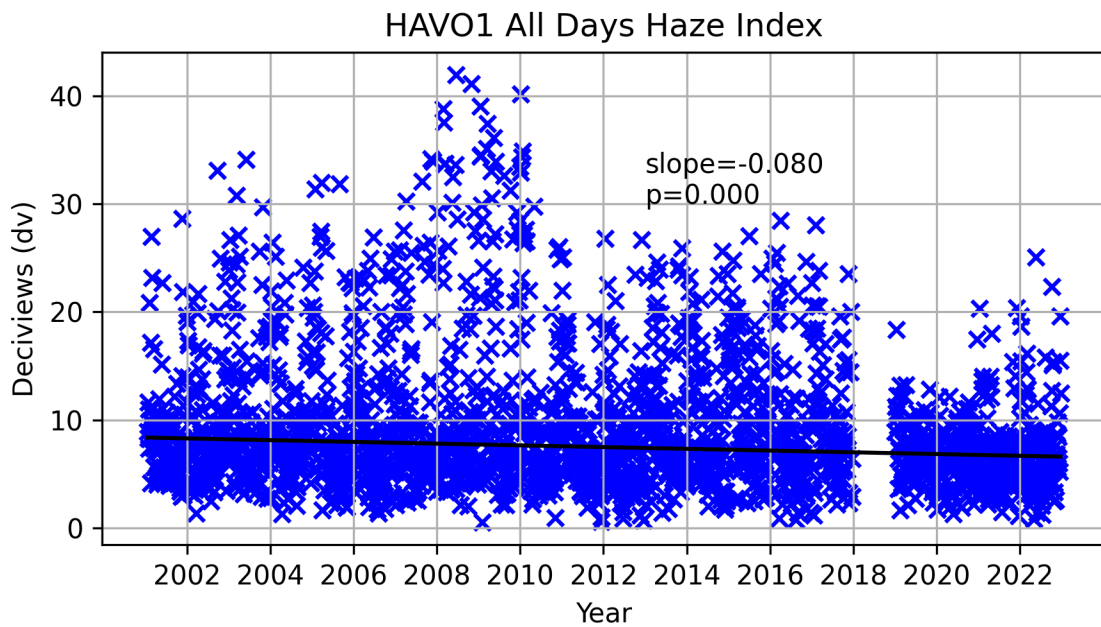


Figure D-32 HAVO1 Haze Index and Their Regression Line for All Days

	Ammonium Sulfate	Ammonium Nitrate	POM	EC	Soil	CM	Sea Salt
Overall Median b_{ext} (Mm^{-1})	5.015	0.573	0.689	0.213	0.059	0.809	1.765
Trend/Theil Slope (Mm^{-1}/yr)	-0.098	-0.007	-0.020	-0.005	-0.002	0.006	0.022
P-value	0.525	0.000	0.000	0.004	0.071	0.028	0.001
Intercept (Mm^{-1})	201.488	13.357	41.656	9.268	3.290	-11.450	-43.358
Percent Change per Year based on Trend (%/yr)	-1.6	-1.0	-2.232	-1.7	-2.1	+0.8	+1.5

Table D-19 HAVO1 Aerosol Species Statistics for All Days

Overall Median Haze Index (dv)	7.527
Trend/Theil Slope (dv/yr)	-0.080
P-value	0.000
Intercept (dv)	169.366
Percent Change per Year based on Trend (%/yr)	-1.0

Table D-20 HAVO1 Haze Index Statistics for All Days