APPENDIX A

National emissions and projections

This Appendix contains the national emission data used throughout this report for main pollutants.

These are the MSC-W estimated emission values used for modelling purposes. As far as possible, the estimated MSC-W emission values correspond to official emission values. The methodology for deriving MSC-W emission estimates is shortly described in Chapter 2 and percentage differences with respect to official emission estimates are presented in Appendix B. For projections, 2010GP values indicate the Gothenburg Protocol values. Where no Gothenburg Protocol values were available, projections for a 2010 baseline with climate policy scenario values derived by IIASA have been used.

The actual gridded emission data used in the EMEP Unified model calculations will be available in autumn 2006 on `http://webdab.emep.int`.

Table A:1: Emissions of sulphur used for modelling at the MSC-W (Gg of SO_2 per year)

Area/Year	1990	1995	2000	2001	2002	2003	2004	2010GP
Albania	74	14	32	32	32	32	32	30
Armenia	86	15	11	11	10	9	8	73
Austria	74	47	32	33	33	33	29	39
Azerbaijan	615	262	162	154	146	138	130	15
Belarus	888	344	162	126	117	107	97	480
Belgium	361	262	171	169	150	147	154	106
Bosnia and Herzegovina	484	360	420	422	423	425	427	411
Bulgaria	2007	1477	918	969	964	994	929	856
Croatia	178	70	60	63	68	75	85	70
Cyprus	46	41	50	47	51	45	45	17
Czech Republic	1876	1090	264	248	235	232	227	283
Denmark	176	133	27	24	24	30	23	55
Estonia	274	117	96	92	88	101	90	44
Finland	259	95	74	85	79	98	83	116
France	1333	968	613	550	510	505	484	400
Georgia	43	6	7	6	6	5	5	9
Germany	5289	1708	630	628	588	595	559	550
Greece	487	536	493	502	517	554	537	546
Hungary	1011	705	486	400	360	339	240	550
Iceland	9	9	9	9	9	9	9	29
Ireland	186	161	131	126	96	76	71	42
Italy	1795	1320	752	708	632	506	418	500
Kazakhstan	651	528	506	486	466	445	425	237
Latvia	97	47	10	8	6	5	4	107
Lithuania	263	92	43	45	43	39	40	145
Luxembourg	26	7	4	4	4	4	4	4
Malta	29	33	26	29	29	33	17	12
Netherlands	189	127	72	73	65	63	66	50
Norway	53	34	27	25	23	23	25	22
Poland	3278	2381	1507	1564	1455	1375	1286	1397
Portugal	317	332	306	294	294	200	203	170
Republic of Moldova	175	94	13	12	15	21	15	135
Romania	1310	882	727	832	783	734	685	918
Russian Federation	6113	3101	2263	2162	2061	1960	1858	2464
Serbia and Montenegro	593	428	396	382	368	355	341	277
Slovakia	542	239	127	131	103	106	97	110
Slovenia	198	127	99	68	71	64	55	27
Spain	2166	1795	1489	1446	1550	1352	1172	774
Sweden	117	79	52	51	51	52	47	67
Switzerland	42	28	19	18	18	18	17	26
TFYR of Macedonia	110	93	90	89	88	88	87	82
Turkey	1519	1397	2122	2039	1957	1875	1792	1708
Ukraine	3921	2342	1599	1461	1324	1232	1145	1457
United Kingdom	3699	2343	1173	1111	994	973	833	625
North Africa	413	413	413	413	413	413	413	413
Remaining Asian areas	854	854	854	854	854	854	854	805
Baltic Sea	168	191	216	221	227	233	239	146
Black Sea	45	51	58	59	61	62	64	67
Mediterranean Sea	858	975	1108	1137	1166	1196	1227	1346
North Sea	361	409	464	475	487	500	513	316
Remaining N-E Atlantic Ocean	384	434	492	504	517	530	543	601
Natural marine emissions	743	743	743	743	743	743	743	743
Volcanic emissions	2000	2000	2000	2000	2000	2000	2000	2000
TOTAL	48781	32338	24617	24144	23374	22602	21490	22471

Table A:2: Emissions of nitrogen oxides used for modelling at the MSC-W (Gg of NO_2 per year)

Area/Year	1990	1995	2000	2001	2002	2003	2004	2010GP
Albania	23	16	22	22	23	24	25	28
Armenia	60	18	31	32	33	38	38	46
Austria	212	193	204	213	220	230	227	107
Azerbaijan	171	85	76	77	80	86	85	43
Belarus	379	232	208	204	205	209	213	255
Belgium	382	372	330	316	300	298	298	181
Bosnia and Herzegovina	73	51	53	53	52	52	52	54
Bulgaria	363	264	184	192	197	202	216	266
Croatia	88	66	77	70	69	69	70	87
Cyprus	19	20	25	19	23	22	19	21
Czech Republic	742	413	398	332	316	324	328	286
Denmark	266	253	188	184	181	189	171	127
Estonia	74	38	37	38	40	39	37	28
Finland	299	258	235	220	208	218	205	170
France	1829	1643	1390	1335	1282	1243	1218	860
Georgia	64	13	30	30	31	32	32	30
Germany	2878	2131	1855	1763	1674	1605	1554	1081
Greece	299	320	328	343	318	343	317	344
Hungary	276	193	194	192	196	192	190	198
Iceland	9	8	9	9	9	11	11	30
Ireland	119	120	129	132	122	117	116	65
Italy	1945	1808	1377	1366	1275	1259	1244	1000
Kazakhstan	179	162	119	127	135	151	151	50
Latvia	69	41	34	38	37	38	39	84
Lithuania	158	65	49	47	51	53	55	110
Luxembourg	20	32	33	32	31	30	29	11
Malta	14	13	12	12	11	12	12	6
Netherlands	549	464	389	381	368	367	360	266
Norway	224	221	224	220	212	215	215	156
Poland	1581	1121	838	848	796	808	804	879
Portugal	243	274	285	286	294	271	271	260
Republic of Moldova	131	79	27	23	25	30	38	90
Romania	527	400	331	335	338	342	346	437
Russian Federation	3600	2570	2457	2582	2698	3105	3093	2758
Serbia and Montenegro	165	133	137	140	141	146	149	168
Slovakia	215	174	109	109	101	98	98	130
Slovenia	63	66	60	59	58	56	57	45
Spain	1247	1351	1477	1459	1522	1519	1519	847
Sweden	306	271	217	211	206	203	197	148
Switzerland	156	119	101	97	92	88	87	79
TFYR of Macedonia	46	35	39	41	42	43	42	41
Turkey	691	789	942	940	937	934	932	852
Ukraine	1753	1245	861	886	911	936	960	1222
United Kingdom	2932	2355	1857	1799	1693	1685	1621	1181
North Africa	96	96	96	96	96	96	96	96
Remaining Asian areas	169	169	169	169	169	169	169	79
Baltic Sea	236	268	303	311	318	327	335	361
Black Sea	62	70	80	82	84	86	88	94
Mediterranean Sea	1234	1402	1593	1634	1677	1720	1765	1914
North Sea	508	575	652	668	685	703	721	777
Remaining N-E Atlantic Ocean	565	639	724	742	760	779	799	863
Natural marine emissions	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0
TOTAL	28310	23715	21593	21515	21343	21809	21713	19310

Table A:3: Emissions of ammonia used for modelling at the MSC-W (Gg of NH_3 per year)

Area/Year	1990	1995	2000	2001	2002	2003	2004	2010GP
Albania	23	19	22	22	23	23	23	26
Armenia	24	15	13	13	12	15	17	25
Austria	69	70	66	65	64	65	64	66
Azerbaijan	68	41	37	36	35	41	48	25
Belarus	215	154	142	134	128	120	121	158
Belgium	112	103	87	84	82	79	74	74
Bosnia and Herzegovina	21	17	17	17	17	17	17	17
Bulgaria	144	99	56	56	56	52	54	108
Croatia	53	52	53	52	53	53	53	30
Cyprus	5	5	6	7	5	6	6	6
Czech Republic	157	87	76	81	74	82	69	101
Denmark	134	114	105	104	102	98	98	69
Estonia	26	12	9	9	9	10	10	11
Finland	38	35	33	33	33	33	33	31
France	787	772	789	775	778	750	742	780
Georgia	36	22	20	19	19	22	26	97
Germany	758	642	646	659	649	648	641	550
Greece	79	81	73	73	72	72	72	73
Hungary	124	77	71	67	65	67	74	90
Iceland	4	4	4	4	4	4	4	3
Ireland	114	121	123	123	119	116	113	116
Italy	405	417	424	433	435	423	412	419
Kazakhstan	664	449	470	487	503	520	537	18
Latvia	47	15	12	14	13	14	13	44
Lithuania	82	34	43	45	46	47	49	84
Luxembourg	7	7	7	7	7	7	7	7
Malta	1	1	1	1	1	1	1	1
Netherlands	249	193	152	143	136	130	134	128
Norway	20	23	23	23	23	23	23	23
Poland	511	378	321	328	325	323	317	468
Portugal	55	63	64	66	64	64	64	108
Republic of Moldova	61	45	28	30	30	27	26	42
Romania	289	193	252	253	257	261	266	210
Russian Federation	1204	837	663	638	613	613	621	835
Serbia and Montenegro	74	63	65	65	65	66	66	69
Slovakia	66	42	32	33	33	31	28	39
Slovenia	25	22	20	20	20	19	17	20
Spain	329	306	388	384	385	399	413	353
Sweden	55	64	58	57	57	56	56	57
Switzerland	68	63	60	57	55	52	58	63
TFYR of Macedonia	15	14	14	14	14	14	14	15
Turkey	373	387	403	404	405	406	407	241
Ukraine	682	463	485	500	517	533	550	592
United Kingdom	382	359	337	330	319	308	336	297
North Africa	235	235	235	235	235	235	235	235
Remaining Asian areas	278	278	278	278	278	278	278	278
Baltic Sea	0	0	0	0	0	0	0	0
Black Sea	0	0	0	0	0	0	0	0
Mediterranean Sea	0	0	0	0	0	0	0	0
North Sea	0	0	0	0	0	0	0	0
Remaining N-E Atlantic Ocean	0	0	0	0	0	0	0	0
Natural marine emissions	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0
TOTAL	9166	7493	7284	7277	7236	7223	7288	7102

Table A:4: Emissions of non-methane volatile organic compounds used for modelling at the MSC-W (Gg of NMVOC per year)

Area/Year	1990	1995	2000	2001	2002	2003	2004	2010GP
Albania	30	31	29	30	31	31	32	36
Armenia	95	37	47	47	48	49	49	81
Austria	284	221	179	182	176	175	172	159
Azerbaijan	376	202	233	233	233	234	234	9
Belarus	497	378	340	320	301	314	326	309
Belgium	305	255	201	194	181	173	165	144
Bosnia and Herzegovina	48	35	40	40	41	41	42	46
Bulgaria	214	192	123	128	123	121	132	185
Croatia	105	74	80	83	91	104	122	90
Cyprus	16	16	16	16	16	16	12	6
Czech Republic	374	281	266	257	238	238	240	220
Denmark	166	152	127	122	118	116	116	85
Estonia	71	47	38	34	39	41	41	30
Finland	221	187	154	157	151	145	142	130
France	2414	2032	1658	1587	1476	1411	1367	1100
Georgia	151	53	110	110	109	108	107	19
Germany	3584	2100	1569	1476	1381	1272	1268	995
Greece	281	302	295	289	261	278	262	261
Hungary	252	191	187	179	176	171	172	137
Iceland	12	12	9	10	10	11	11	7
Ireland	111	105	90	87	81	78	63	55
Italy	2023	2022	1538	1453	1344	1307	1273	1159
Kazakhstan	214	122	140	143	145	147	150	50
Latvia	73	62	58	58	59	60	64	136
Lithuania	136	71	78	71	72	75	67	92
Luxembourg	16	22	13	12	11	11	10	9
Malta	8	8	8	8	8	8	7	2
Netherlands	491	364	267	242	236	222	216	191
Norway	295	367	379	389	343	297	265	195
Poland	832	771	606	607	600	606	600	800
Portugal	273	288	282	284	286	287	287	202
Republic of Moldova	123	83	42	44	45	36	33	100
Romania	517	357	378	385	391	398	404	523
Russian Federation	3659	2848	2445	2510	2574	2791	2675	2760
Serbia and Montenegro	158	125	141	142	144	145	147	154
Slovakia	122	111	86	88	84	88	91	140
Slovenia	53	55	51	49	48	46	46	40
Spain	1135	1093	1162	1147	1139	1146	1153	669
Sweden	443	362	282	270	264	265	255	241
Switzerland	262	177	130	126	121	117	98	144
TFYR of Macedonia	21	27	25	26	27	27	28	32
Turkey	636	523	563	561	559	556	554	656
Ukraine	1053	748	641	662	683	704	725	797
United Kingdom	2396	1939	1348	1252	1175	1073	1024	1200
North Africa	96	96	96	96	96	96	96	96
Remaining Asian areas	204	204	204	204	204	204	204	186
Baltic Sea	8	9	10	11	11	11	12	13
Black Sea	2	3	3	3	3	3	3	4
Mediterranean Sea	41	47	54	55	56	58	59	69
North Sea	18	20	23	23	24	25	25	29
Remaining N-E Atlantic Ocean	19	21	24	25	25	26	27	31
Natural marine emissions	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0
TOTAL	24936	19847	16868	16527	16059	15964	15673	14825

Table A:5: Emissions of carbon monoxide used for modelling at the MSC-W (Gg of CO per year)

Area/Year	1990	1995	2000	2001	2002	2003	2004	2010GP
Albania	139	139	124	122	119	117	114	160
Armenia	563	82	164	166	170	180	186	104
Austria	1222	1010	798	782	738	762	742	727
Azerbaijan	898	253	191	188	188	191	193	293
Belarus	759	744	725	719	727	741	758	837
Belgium	1380	1114	1072	1009	969	956	972	306
Bosnia and Herzegovina	132	75	96	100	103	107	111	160
Bulgaria	827	786	667	659	700	696	755	568
Croatia	698	412	395	327	309	293	279	480
Cyprus	62	69	83	86	84	85	85	83
Czech Republic	1050	935	650	602	544	578	572	475
Denmark	753	716	576	593	577	595	578	358
Estonia	314	207	177	178	178	183	175	126
Finland	562	440	530	604	599	564	554	644
France	10711	8519	6628	6311	6010	5815	5977	4795
Georgia	794	133	670	668	669	671	672	223
Germany	12120	6404	4991	4696	4434	4311	4095	4245
Greece	1281	1319	1295	1266	1166	1199	1265	1237
Hungary	1000	761	633	592	584	541	525	492
Iceland	43	43	46	46	46	46	46	19
Ireland	411	315	280	270	251	235	236	204
Italy	7240	7133	5188	5108	4506	4403	4310	3651
Kazakhstan	869	320	287	291	298	313	321	279
Latvia	405	364	296	314	306	311	342	185
Lithuania	562	283	278	226	224	222	184	228
Luxembourg	61	57	49	49	48	48	48	42
Malta	23	26	20	17	15	12	10	21
Netherlands	1150	883	751	669	668	648	623	623
Norway	868	735	564	552	546	510	483	1552
Poland	4577	4493	3414	3598	3412	3318	3426	2863
Portugal	880	852	749	700	689	675	668	1794
Republic of Moldova	419	254	90	95	91	91	77	192
Romania	1324	909	1319	1282	1246	1209	1172	1034
Russian Federation	15439	10535	11315	11856	12398	13286	13837	9806
Serbia and Montenegro	431	332	389	396	403	409	416	573
Slovakia	570	431	320	322	299	315	316	240
Slovenia	107	123	101	95	90	83	84	199
Spain	3538	3106	2597	2544	2427	2323	2231	3362
Sweden	1133	1010	730	691	659	627	588	624
Switzerland	641	468	401	378	361	331	336	346
TFYR of Macedonia	95	88	84	83	83	80	77	214
Turkey	3825	4146	3920	3663	3674	3685	3693	3778
Ukraine	3725	2425	2276	2318	2360	2295	2691	3055
United Kingdom	8286	6345	4285	4088	3617	3103	2923	1924
North Africa	336	336	336	336	336	336	336	336
Remaining Asian areas	449	449	449	449	449	449	449	131
Baltic Sea	24	27	31	32	33	33	34	40
Black Sea	6	7	8	8	9	9	9	11
Mediterranean Sea	124	141	160	164	168	173	177	207
North Sea	52	59	67	68	70	72	74	85
Remaining N-E Atlantic Ocean	55	62	70	72	74	76	78	90
Natural marine emissions	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0
TOTAL	92932	70876	61335	60446	58724	58310	58902	54020

APPENDIX B

Percentage differences with official national emissions

This Appendix presents differences between officially reported national total emissions and estimated national totals used throughout this report. The information presented in overview tables are percentage differences in the national total emissions after gap filling and replacements of sector data has taken place. The methodology used for replacement and gap filling of emission data is described in detail in Vestreng et al (2006) (EMEP/technical report 1/2006) and a summary is provided in Chapter 2 in this report.

In the overview tables, empty cells indicate that no official emissions were not reported. Bold values indicate differences between official and MSC-W estimated values above 10%.

The emission data from official reports is available at http://webdab.emep.int

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AL															
AM	**17**	**18**	**24**	**87**	**86**	**84**	**90**	**97**	**74**	**93**	**27**	**58**	**21**	**-18**	
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ												**90**			
BA	1														
BE	0	3	1	2	10	0	1	2	-3	3	0	0	-4	-3	-4
BG	0	0	0	0	0	0	0	0	0	0	-6	3	0	3	0
BY	**28**	**16**	**32**	**32**	**28**	**20**	**20**	**23**	**19**	**18**	**12**	**-19**	**-21**	**-22**	1
CH	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
CS	**14**	**20**	**25**	**19**	8	-7	-2	**-25**	**-26**	**12**	2	-2	-3	**-11**	**-14**
CY	1	0	0	1	0	1	1	2	0	3	1	-1	0	0	0
CZ	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE	**-479**	**-448**	**-383**	**-247**	**-257**	**-252**	**-406**	**-435**	**-213**	**-28**	**12**	2			
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR	0	0	0	0	0	0	0	0	0	0	3	0	0		
HU	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2
IE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IS	**-176**	**-161**	**-166**	**-168**	**-156**	**-153**	**-156**	**-162**	**-189**						
IT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
KZ	**56**	**48**	**46**	**44**	**51**	**49**	**62**	**55**	**53**	**57**	**53**				
LT	**15**	-1	**28**	**22**	7	-1	**-12**	-5	**-49**	**-31**	0	-7	0	0	-4
LU	**41**			-1	**-18**	**-22**	**-18**	1	**29**	**23**	**28**		**38**	**38**	
LV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MD	0	0	**-17**	**-23**	1	**32**	**14**	**41**	**29**	**58**	0	0	0	0	0
MK								**82**	**-14**		**-16**	**-52**	**-87**	**-71**	**-15**
MT														0	0
NL	0	2	-4	-7	-4	0	**-14**	-8	-9	**-12**	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PL	2	1	1	0	0	0	0	0	0	0	0	0	0	0	3
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	0	0	0	0	0	0	0	0	0	0	0	0			
RU	**24**	**16**	**18**	**16**	**15**	4	5	9	**12**	**15**	**12**	6	0	-7	-5
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	1	1	1	1	1	2	2	2	2	3	2	4	4	4	5
SK	3	0	-2	0	-2	-2	-1	-1	-2	0	0	0	0	0	0
TR	**50**	**44**	**44**	**47**	**30**	**28**	**24**	**27**	**26**	-5	**37**	-1		**63**	
UA	**29**	**30**	**28**	**26**	**35**	**30**	**41**	**45**	**46**	**41**		**-25**	0	-1	9

Table B:1: Differences in % of SOx emission totals after gap filling and replacements of sectordata. Bold cells indicate differences above 10%. Empty cells indicate that no emissions were reported.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AL															
AM	**22**	**22**	**49**	**65**	**55**	**18**	**45**	**35**	**57**	**62**	**68**	**58**	**62**	**62**	
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ												**44**		**18**	
BA															
BE	0	**14**	**12**	**12**	**11**	0	**13**	**14**	10	**15**	0	0	0	0	0
BG	1	2	2	2	0	0	0	0	0	0	0	2	0	-2	0
BY	**25**	**20**	**30**	**29**	**22**	**16**	**24**	**15**	**25**	**33**	**35**	**34**	**33**	**33**	**31**
CH	-1	0	0	0	0	-1	0	0	4	6	-2	5	-1	-1	-2
CS	**60**	**62**	**65**	**60**	**61**	**56**	**57**	**55**	**55**	**65**	**64**	**64**	**64**	**64**	**64**
CY	5	7	5	3	5	6	7	7	6	4	7	5	4	1	5
CZ	**27**	**28**	**29**	**21**	**14**	**11**	**15**	**17**	**22**	**20**	0	0	0	0	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE	0	0	0	0	0	0	0	0	0	0	**-12**	0	0	0	0
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE	**-101**	**-108**	-8	3	10	**-104**	**-201**	**-174**	**-81**	**-12**	**-39**	**-43**			
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR	0	0	0	0	0	0	0	0	0	0	0	0	0		
HU	**14**	**14**	**14**	8	5	2	0	0	1	2	4	4	8	6	2
IE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IS	**-201**	**-207**	**-228**	**-240**	**-241**	**-233**	**-243**	**-227**	**-213**						**-156**
IT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
KZ	**-97**	**-127**	**-118**	**-120**	**-79**	**-74**	**-63**	**-47**	**-67**	**-60**	**-68**				
LT	0	0	0	0	0	0	0	10	8	6	2	**-16**	0	0	0
LU	**-12**			9	**23**	**35**	**32**	**45**	**48**	**51**	**48**		**44**	**42**	
LV	0	**11**	**11**	0	0	0	0	0	-1	-1	-1	0	0	0	0
MD	0	**19**	**39**	**47**	**48**	**52**	**45**	**37**	**55**	**55**	0	0	0	0	0
MK								**84**	**59**		**22**	**23**	**12**	**-16**	**20**
MT														0	0
NL	0	-6	-7	-6	-5	0	**-12**	-5	-5	-7	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PL	**19**	**15**	**15**	8	8	0	0	0	0	0	0	5	0	0	0
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0
RO	-3	7	**25**	**29**	**25**				8	**27**	**13**	-3			
RU	0	0	0	0	0	0	0	2	2	3	4		8	9	9
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0
SK	-2	-3	-3	-2	-2	-1	-1	-1	-1	-2	0	0	0	0	0
TR	7	9	9	0	5	-1	-6	-2	2	-3	0	5		-1	
UA	**37**	**40**	**46**	**52**	**58**	**57**	**60**	**58**	**45**	**42**	**35**	**-22**	**35**	**44**	**47**

Table B:2: Differences in % of NOx emission totals after gap filling and replacements of sectordata. Bold cells indicate differences above 10%. Empty cells indicate that no emissions were reported.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AL															
AM	-2	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	0	0	
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ															
BA															
BE	0	**16**	**15**	9	8	0	1	-1	-9	-10	0	0	0	0	0
BG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BY	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
CH	0	0	0	0	0	0	0	0	0	0	0	-3	-8	**-13**	0
CS															
CY												**-29**	**-25**	0	0
CZ	1	1	-1	-2	-3	1	2	2	2	2	2	5	3	0	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FI	0		**-11**			0	3	0	-6	-5	0	0	0	0	0
FR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE															
GR	0	0	-1	-1	-1	-4	-1	-1	-1	0					
HR	**30**	**39**	**49**	**51**	**53**	**52**	**55**	**57**	**57**	**55**	**58**	0	4		
HU	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0
IE	2	2	2	1	1	1	1	1	1	1	0	0	0	0	0
IS															
IT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
KZ	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**				
LT	-1	**-15**	**-28**	**-48**	**-80**	**-11**	0	8	**12**	**30**	**42**	**-11**	-10	**28**	**31**
LU	6			6	1	2	2	2	1	-2	-2		**22**	**22**	
LV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MD	-2	**15**	**19**	**28**	**27**	**26**	**25**	**34**	**28**	**21**	**11**	**12**	10	-1	0
MK															**48**
MT														0	0
NL	0	4	**21**	**11**	**19**	0	**22**	-4	1	0	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PL	1	-1	-6	0	0	0	0	0	0	0	0	0	0	0	0
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	-3	0	-1	3	-4				**12**	**11**	**18**	**35**			
RU	1	1	1	1	2	2	2	2	2	2	2		2	2	2
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	4	6	1	4	4	2	2	6	2	2	1	1	1	1	1
SK	1	2	3	5	5	4	5	5	6	6	6	6	6	3	7
TR						**100**	**100**	**100**	**100**	**100**	**100**				
UA	-6	**-14**	**-15**	**-12**	**-15**	**-16**	-10	-1	**14**	**24**	**26**	**24**	**48**	**54**	**59**

Table B:3: Differences in % of NH3 emission totals after gap filling and replacements of sectordata. Bold cells indicate differences above 10%. Empty cells indicate that no emissions were reported.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AL															
AM	**15**	**16**	**57**	**67**	**65**	**37**	**54**	**14**	**60**	**61**	**66**	**40**	**71**	**43**	
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ												**96**		**90**	
BA															
BE	**-15**	9	7	4	3	**-19**	1	-5	**-20**	**-16**	**-23**	**-24**	**-26**	**-28**	**-28**
BG											2	4	0	2	1
BY	-6	**-14**	8	**13**	9	**48**	**12**	5	**17**	**31**	**34**	**33**	**24**	2	1
CH	0	0	0	0	0	0	0	0	0	0	0	3	6	10	0
CS															
CY												7	0	-1	0
CZ	**-17**	**-16**	**-16**	**-14**	-2	-3	-1	3	**12**	**11**	7	**14**	**15**	**15**	**16**
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EE	2	2	3	4	3	3	3	3	3	6	10	3	3	3	3
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FI	0	0	0	0	0	0	0	0	0	1	-2	0	0	0	1
FR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE	**69**	**94**	**97**	**98**	**98**	**97**	**96**	**96**	**88**	**81**	**75**	**74**			
GR	0	0	0	0	0	0	0	0	0	0	-1	-1	-10	-3	**-37**
HR	0	0	0	0	0	0	0	0	0	0	0	3	3		
HU	**19**	**24**	**25**	**24**	**24**	**21**	**21**	**22**	**22**	8	8	7	**12**	9	8
IE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IS															
IT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
KZ	**100**	**100**	**100**	**100**	**99**	**99**	**100**	**100**	**100**	**100**	**100**				
LT	**21**	**17**	**30**	**35**	**31**	-8	-5	5	9	**17**	**22**	0	1	1	0
LU	**-21**			7	**12**	**27**	**20**	**18**	**21**	0	**-14**		-9	**-16**	
LV	**-35**	-1	**-34**	-10	0	0	0	0	1	1	1	2	2	1	1
MD	0	**-30**	8	**25**	**28**	**26**	**14**	-2	**27**	**56**	**52**	**44**	**38**	**20**	0
MK															10
MT														4	4
NL	0	1	1	2	0	0	-5	3	0	1	0	0	0	0	0
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PL	0	0	0	0	0	0	0	0	0	0	1	5	0	3	2
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	**-18**	-7	-9	**-18**	**-29**				-4	5	2	**15**			
RU	0	0	0	0	0	0	0	0	0	0	0		-7	5	6
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	**17**	**19**	**19**	**19**	**19**	**19**	**17**	**17**	**21**	**21**	0	0	0	0	0
SK	**-12**			-4		4	3	4	5	6	7	6	7	7	6
TR	**27**	**25**	**19**	7	6	**-28**	**-41**	**-44**	**-46**	**-41**	**-28**	**-57**		**17**	
UA	**-29**	**-30**	**-25**	**-11**	**-26**	-7	1	6	**63**	**59**		**59**	**59**	**55**	**45**

Table B:4: Differences in % of NMVOC emission totals after gap filling and replacements of sectordata. Bold cells indicate differences above 10%. Empty cells indicate that no emissions were reported.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AL															
AM	**46**	**19**	**47**	**47**	**28**	**-110**	**-26**	**-94**	5	**16**	**33**	**37**	**37**	**33**	
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ												**-55**		**79**	
BA															
BE	0	**17**	**12**	**11**	**11**	0	10	**14**	-1	6	0	0	-1	0	0
BG	-7	4	**-15**	**-13**	**-17**	-7	9	**21**	8	10	0	6	0	-2	0
BY	**-126**	**-126**	**-82**	**-59**	**-65**	**-67**	**-67**	**-65**	**-40**	-7	1	1	2	1	1
CH	0	0	0	0	0	0	0	0	0	0	0	-1	-2	-7	-1
CS															
CY												1	1	0	**47**
CZ	**-19**	-5	-9	-10	**-12**	-6	-6	-7	1	1	0	-7	0	0	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DK	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-6
EE	0	0	0	0	0	0	0	0	0	0	**-13**	0	0	0	0
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	
FI	0	-4	1	1	1	1	1	1	1	1	1	0	0	0	1
FR	0	0	0	0	0	-3	0	0	0	0	0	0	0	0	0
GB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE	**34**	**33**	**76**	**64**	**44**	**-87**	**-61**	**-22**	**22**	**60**	**68**	**67**			
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**50**
HR	6	7	10	**11**	**11**	9	0	0	0	-1	-1	0	0	**-104**	**-109**
HU	0	0	0	0	0	0	0	0	0	0	0	0	-5		
IE	2	2	2	3	3	3	3	3	3	3	0	0	0	0	0
IS															
IT	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
KZ	**-88**	**-159**	**-201**	**-233**	**-231**	**-344**	**-362**	**-349**	**-347**	**-304**	**-288**				
LT	8	5	**12**	**15**	**13**	0	0	0	0	0	0	0	0	0	0
LU	**-185**			**-272**	**-149**	**-86**	**-85**	**-48**	4	0	1		0	0	
LV	**-13**	3	**-69**	**22**	-2	-3	-3	-5	-6	-6	-7	-4	-4	-4	-3
MD	**-17**	**-20**	**21**	**32**	**40**	**24**	**23**	**-11**	1	**18**	7	7	**-17**	**-52**	**-89**
MK								**73**	**70**		8	8	2	**-73**	**-22**
MT															
NL	0	7	6	3	3	1	-4	10	9	10	1	2	2	2	2
NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PL	**-61**		**-50**	**-82**	-6	0	0	-4	-6	-9	0	2	0	**21**	0
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	**-140**	**-116**	**-115**	**-125**	**-133**				**-19**	8	6	7			
RU	**14**	**12**	**11**	10	8	6	6	5	5	5	4		7	**13**	**12**
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SI	**24**	**23**	**26**	**25**	**24**	**26**	**25**	**26**	**30**	**32**	2	2	2	2	2
SK	10	6	3	6	3	3	6	4	1	0	2	2	2	2	2
TR	6	6	6	5	5	4	4	4	4	4	4	4		8	
UA	**-118**	**-113**	**-70**	**-42**	**-25**	**-19**	-6	-5	**-19**	**-15**		**-33**	**-17**	**-20**	**-13**

Table B:5: Differences in % of CO emission totals after gap filling and replacements of sectordata. Bold cells indicate differences above 10%. Empty cells indicate that no emissions were reported.

APPENDIX C

Progress towards Gothenburg by Parties

This Appendix presents an overview of the progress towards attaining the goals in provided in the Gothenburg Protocol for all Parties to the Convention. The Parties status with respect to the Gothenburg Protocol is indicated for each Party.

All values are based on the estimated emissions in Appendix A, atmospheric transport calculations with the last version of the EMEP Unified model (rv 2.5) and the latest update (2006) of critical loads.

There are usually 8 figures per Party, however in some cases, where no critical load data is available, only 6 figures are presented. The figures correspond to:

Figure 1: Trends in emissions for all pollutants in the Gothenburg Protocol. Differences with respect to the official estimates are specified in Appendix B.

Figure 2: Distance to target for emissions. Percentage of the projected emission reduction still remaining in the different years. Negative values means that the projected emission reduction has already been reached. The percentage is calculated by

$$\frac{E_{\text{year}} - E_{2010}}{|E_{1990} - E_{2010}|}$$

Figure 3: Trends in depositions of oxidised Sulphur (dep S), oxidised Nitrogen (dep oxN) and reduced Nitrogen (dep redN).

Figure 4: Trends in depositions of oxidised Sulphur (dep S), oxidised Nitrogen (dep oxN) and reduced Nitrogen (dep redN)in percentage, relative to 1990 deposition

levels.

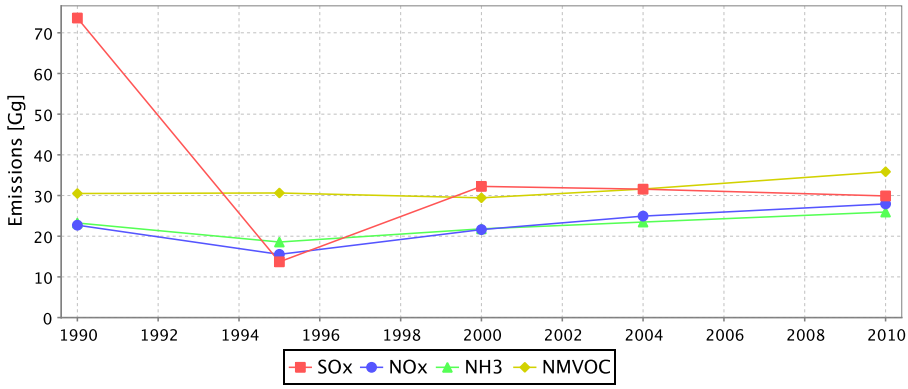
Figure 5: Trends in accumulated exceedances of critical loads of acidification and eutrophication.

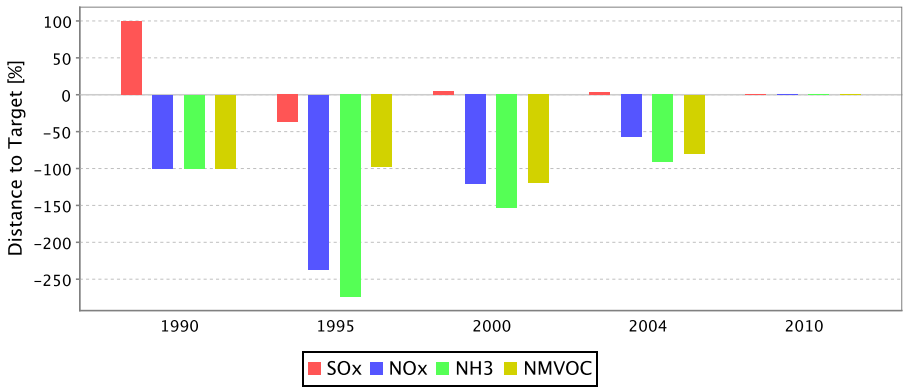
Figure 6: Trends in the percentage of unprotected ecosystem area for eutrophication and acidification.

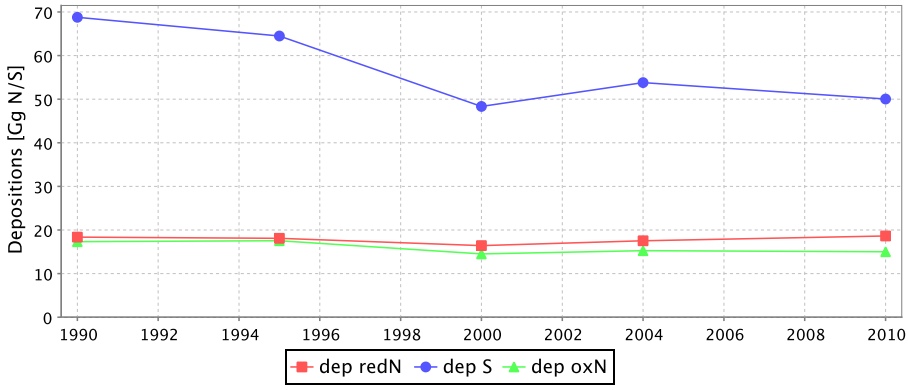
Figure 7: Trends in the SOMO35 indicator of ozone concentrations relevant for health impacts.

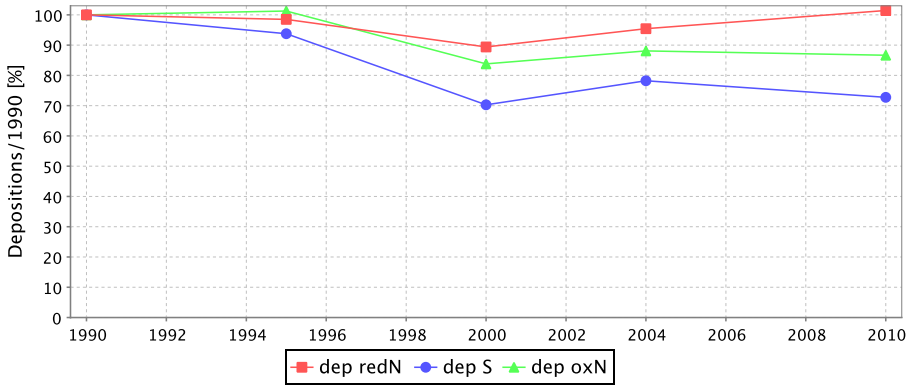
Figure 8: Trends in accumulated stomatal ozone fluxes above a threshold, relevant to determine ecosystem impact effects in deciduous forests (AFst 1.6) and crops (AFst 3).

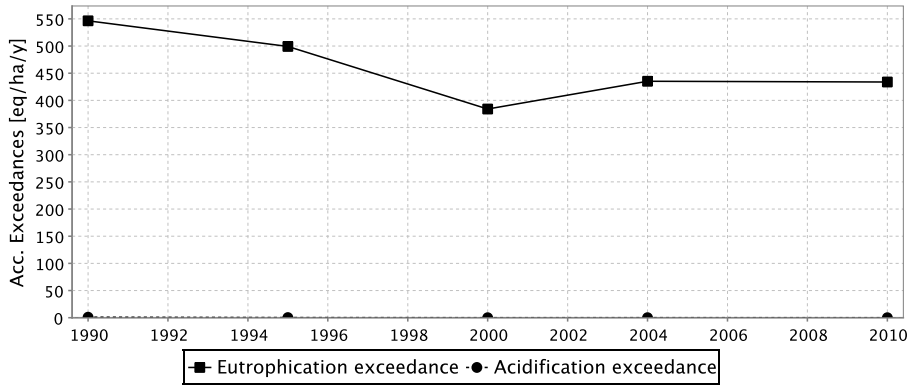
Albania (Not included in the Gothenburg Protocol)

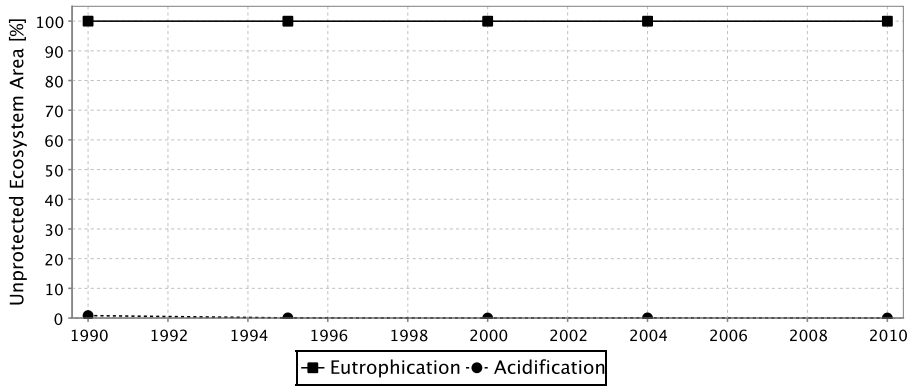


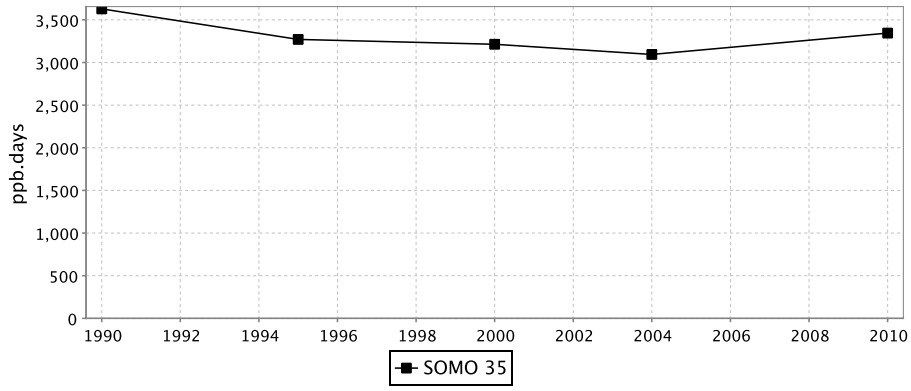


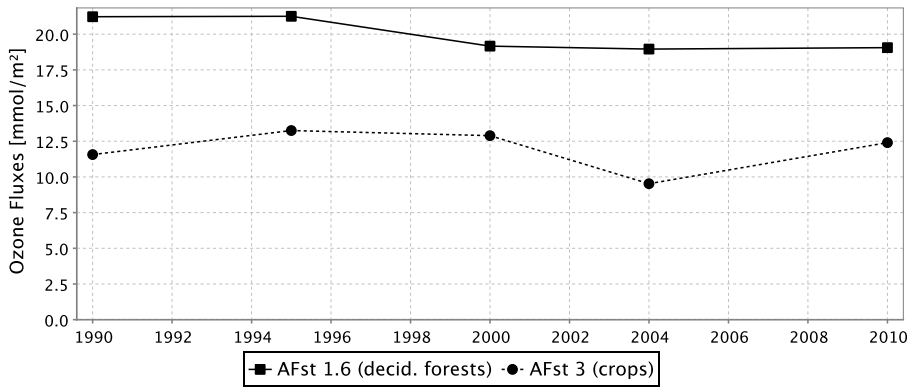




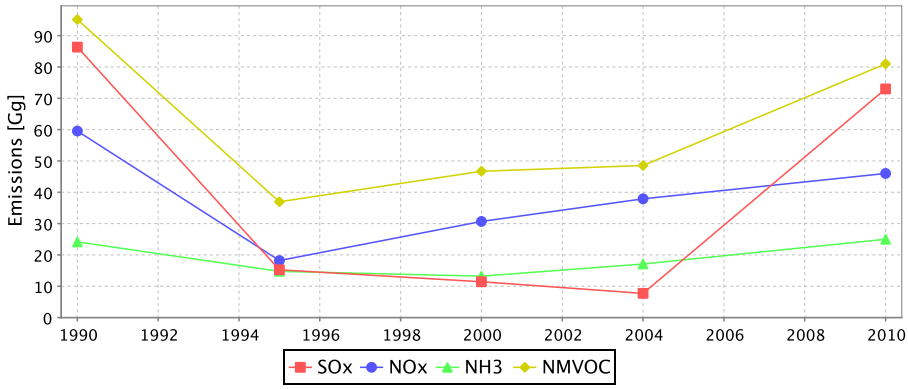

Acc. Exceedances [eq/ha/y]
550
500
450
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

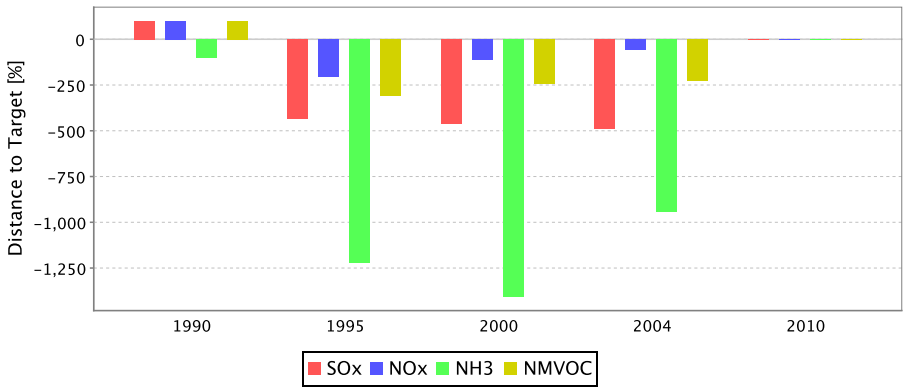

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

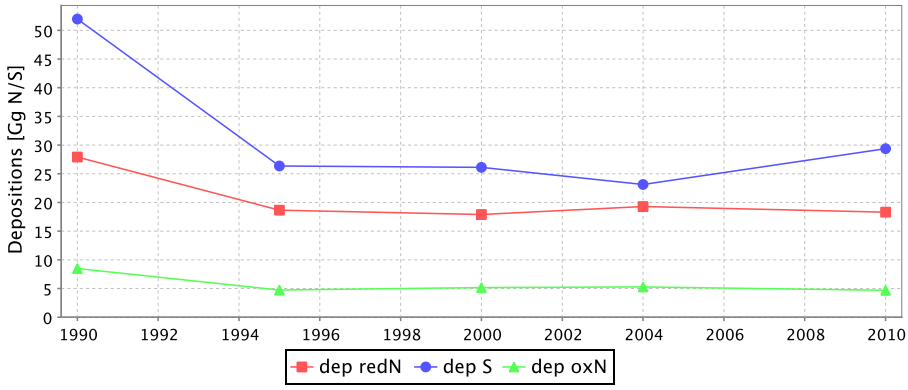

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

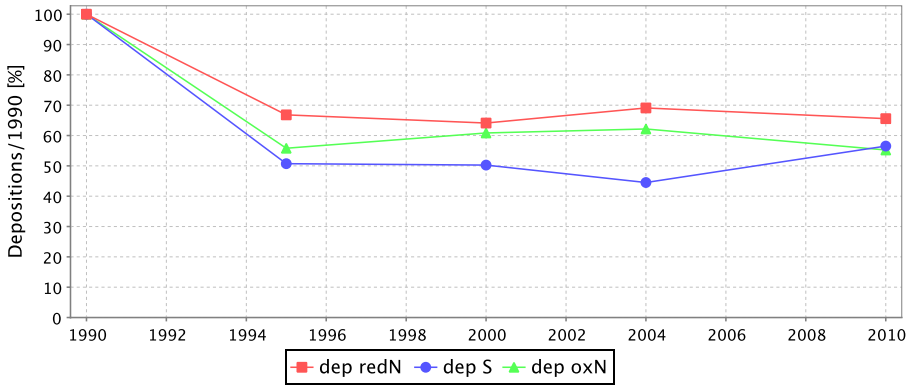

Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

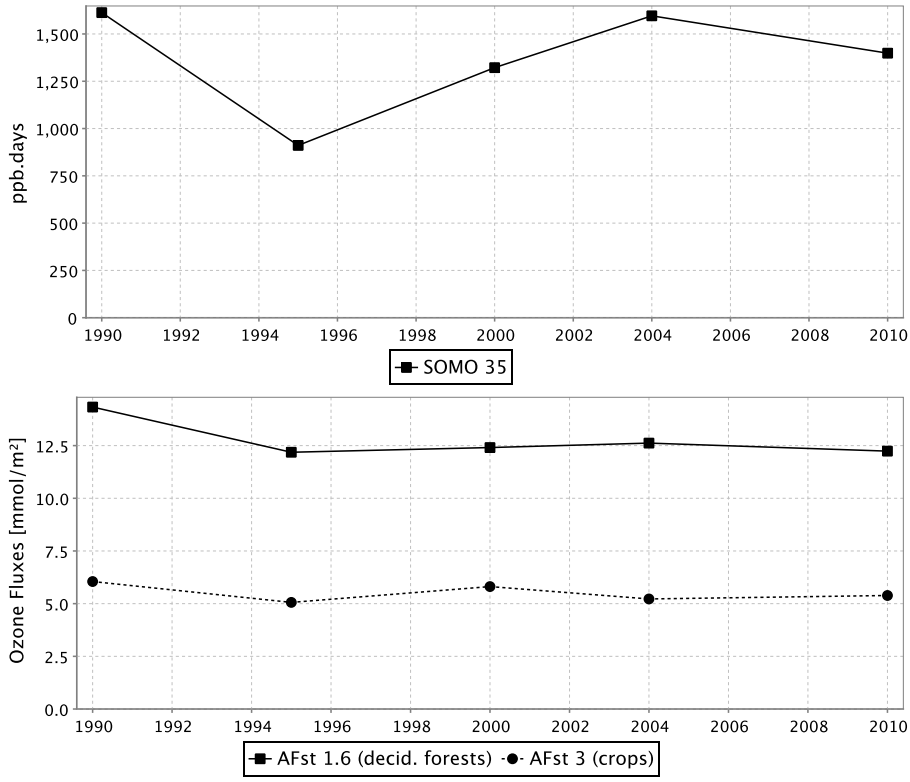
Armenia (Signatory to the Gothenburg Protocol)



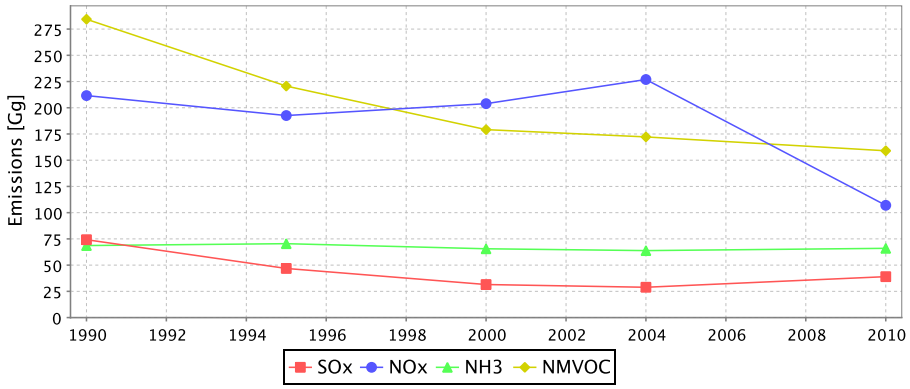


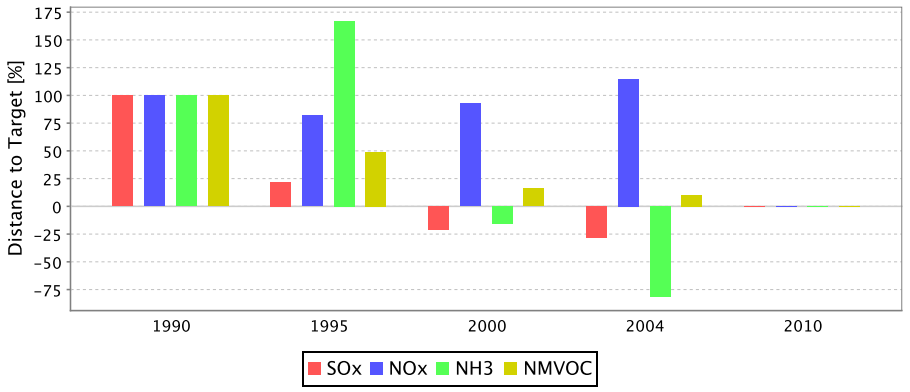


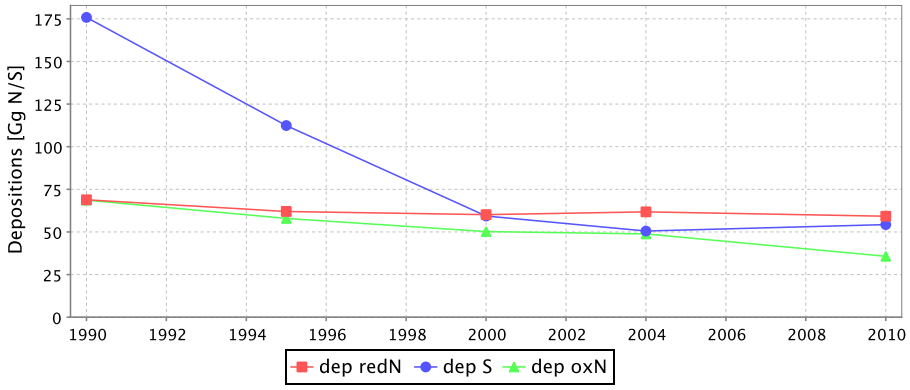


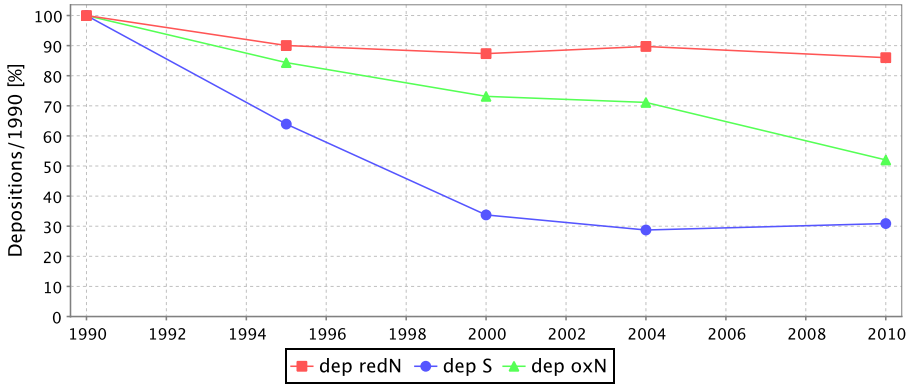

ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
12.5
10.0
7.5
5.0
2.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

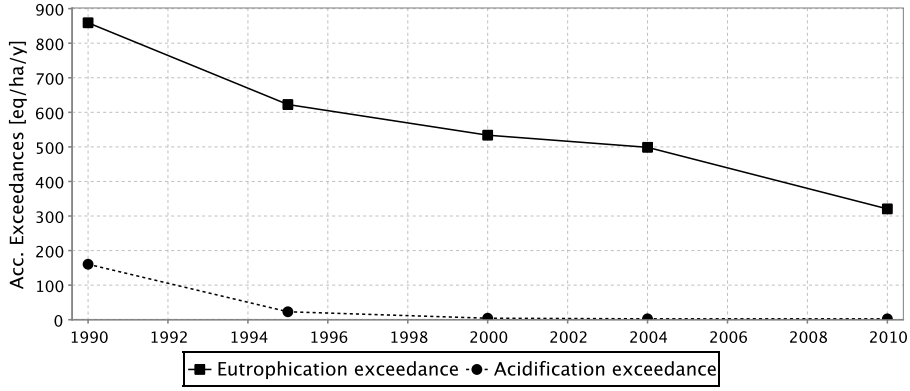
Austria (Signatory to the Gothenburg Protocol)

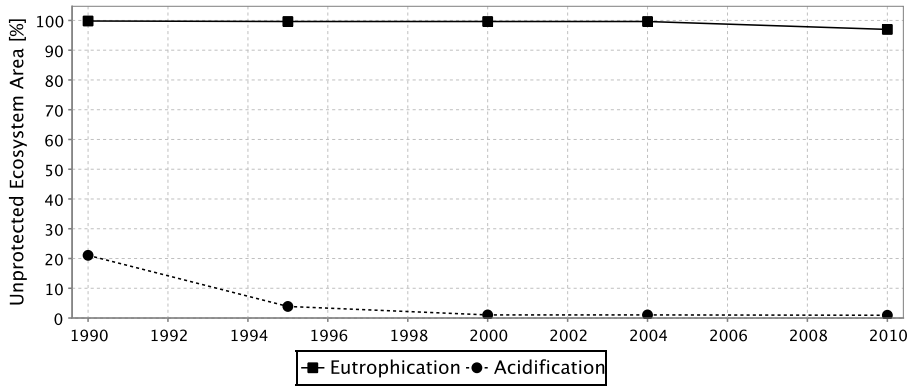


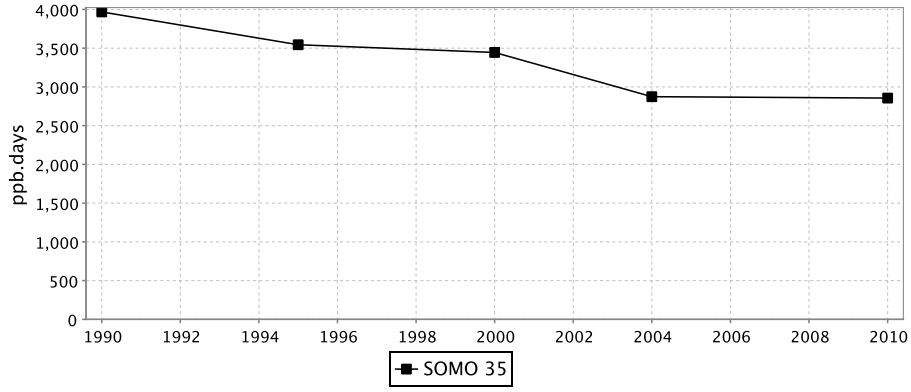


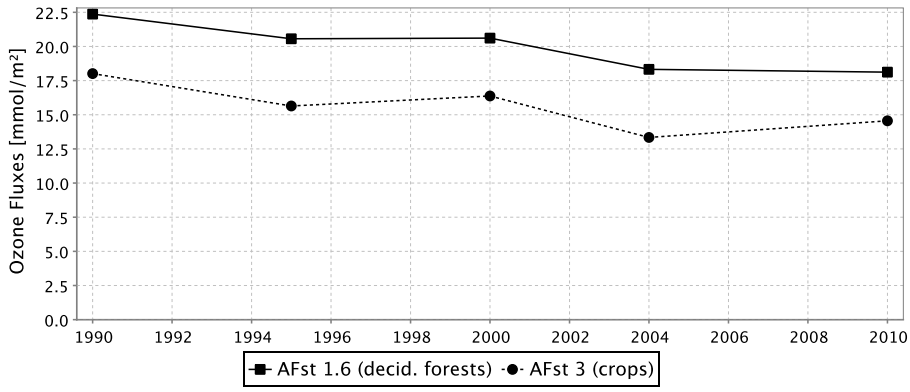




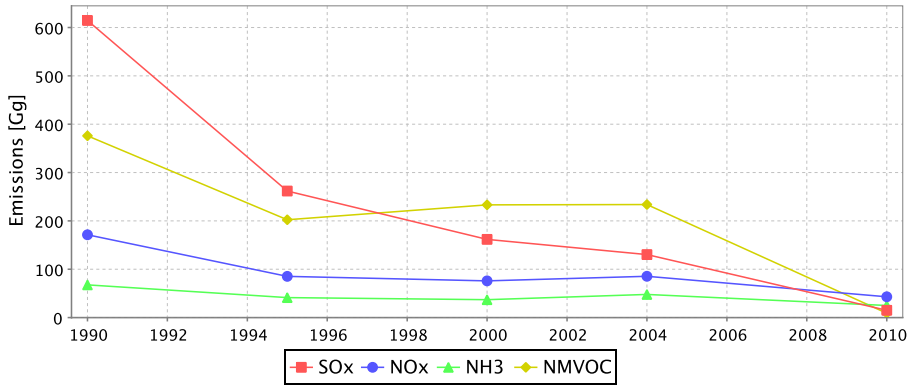

Acc. Exceedances [eq/ha/y]
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

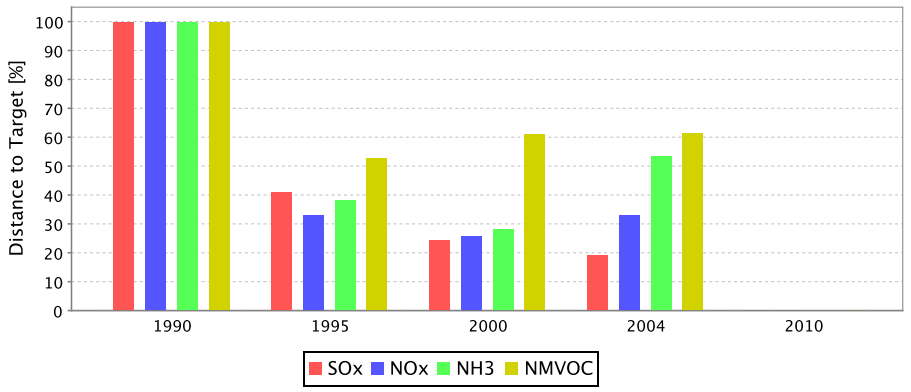

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

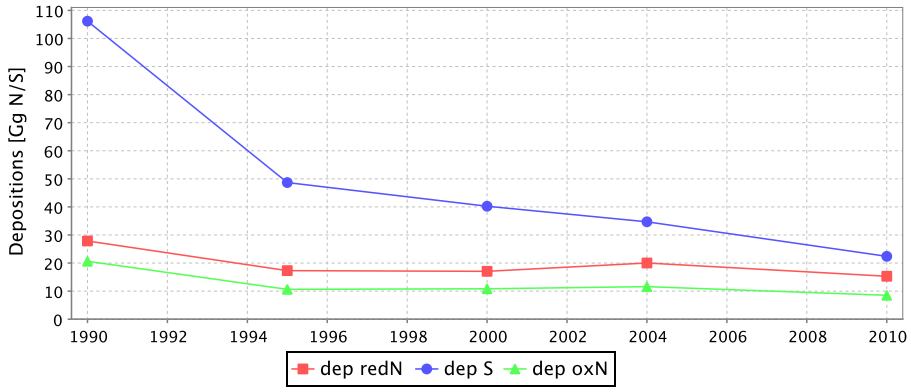

ppb.days
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

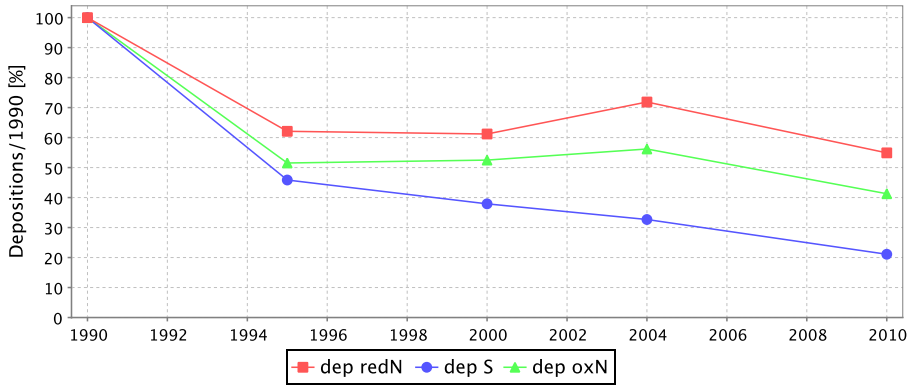

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

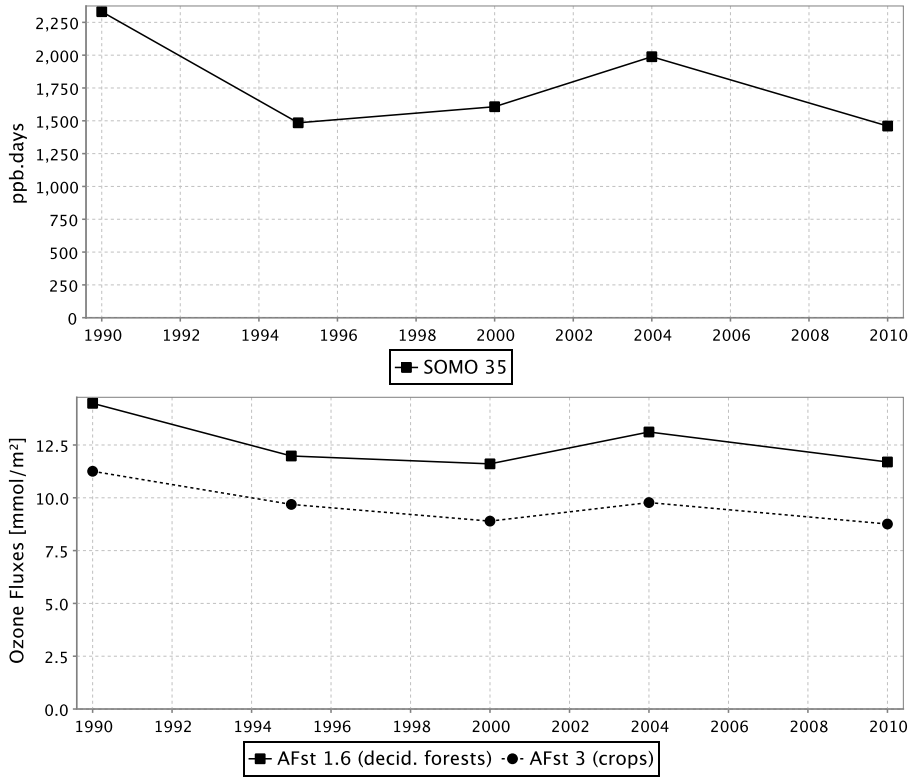
Azerbaijan (Not included in the Gothenburg Protocol)



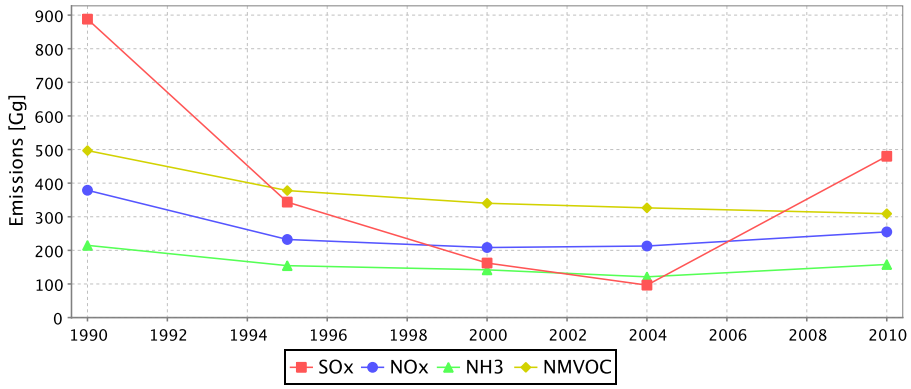


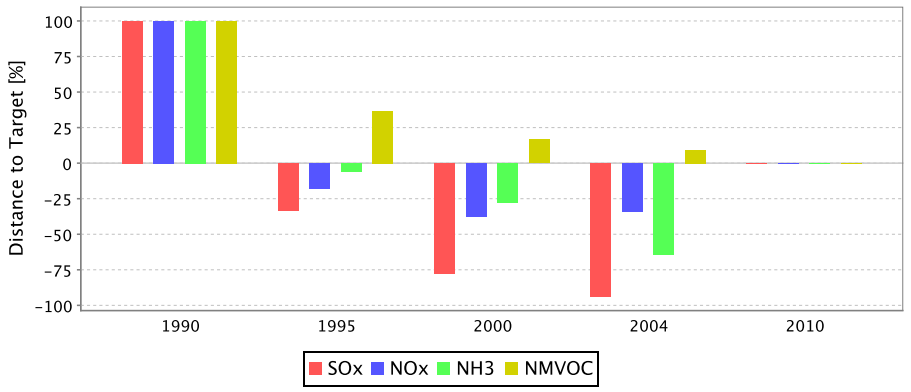


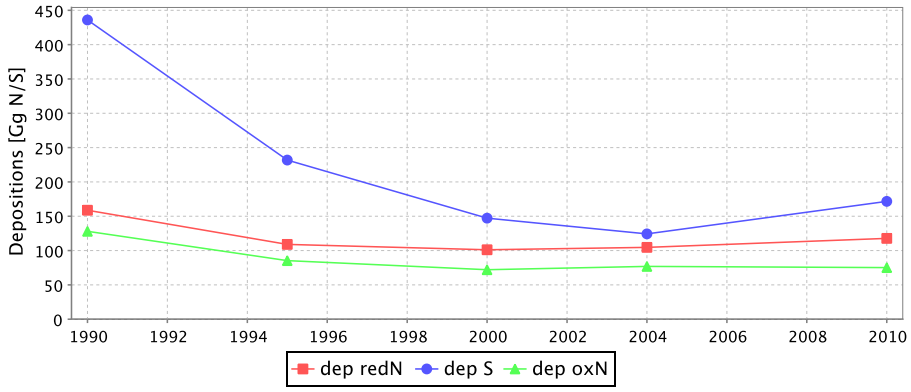


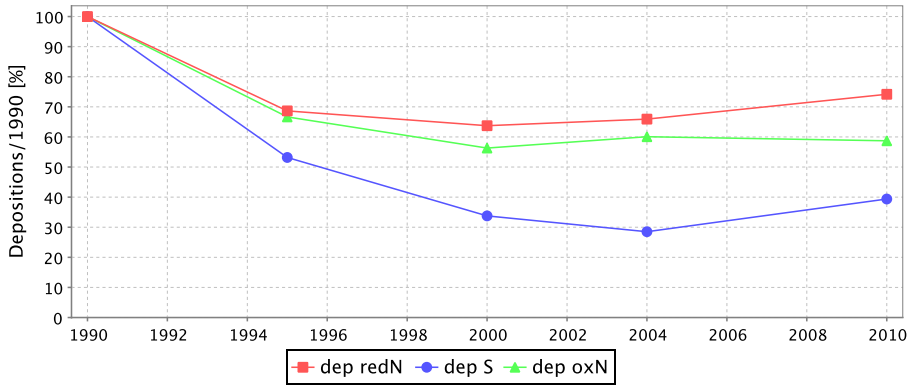

ppb.days
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
12.5
10.0
7.5
5.0
2.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

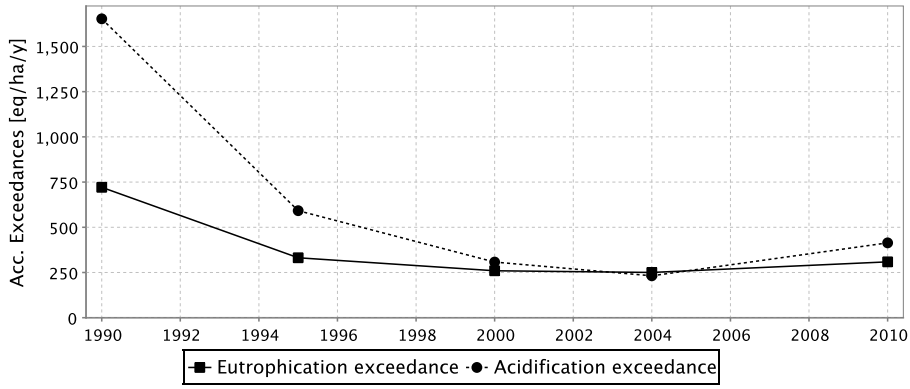
Belarus (Non-Signatory to the Gothenburg Protocol)

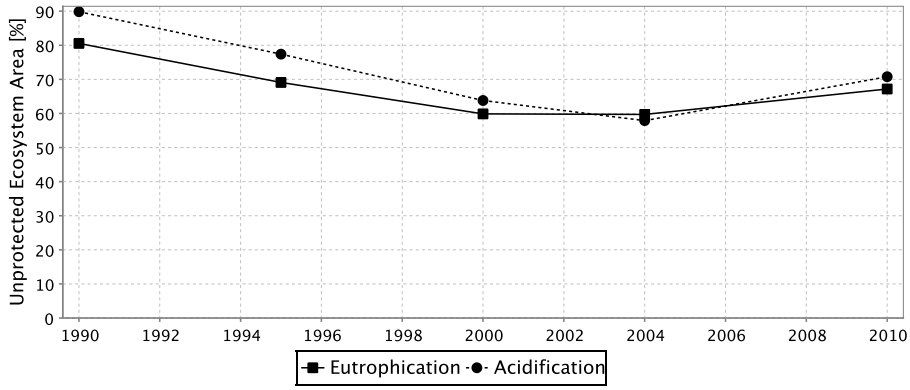


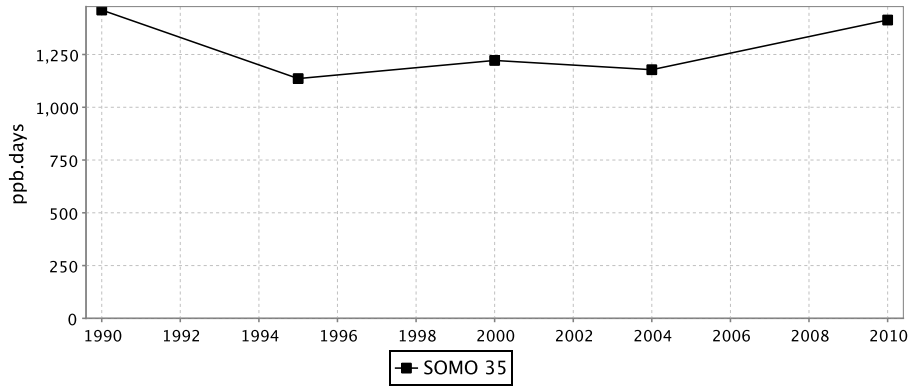


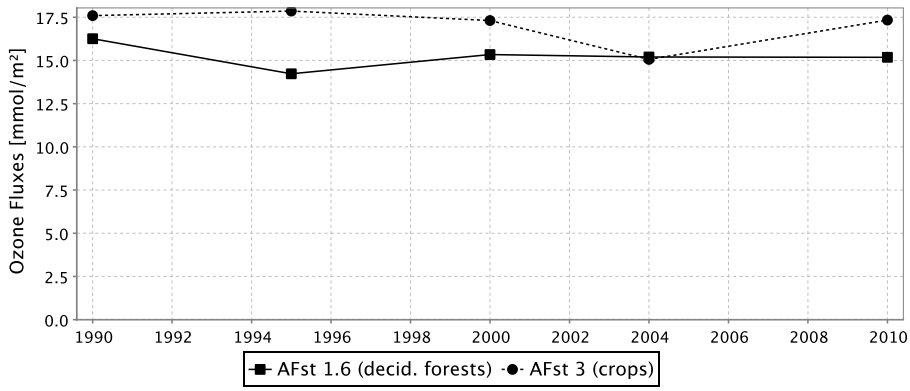




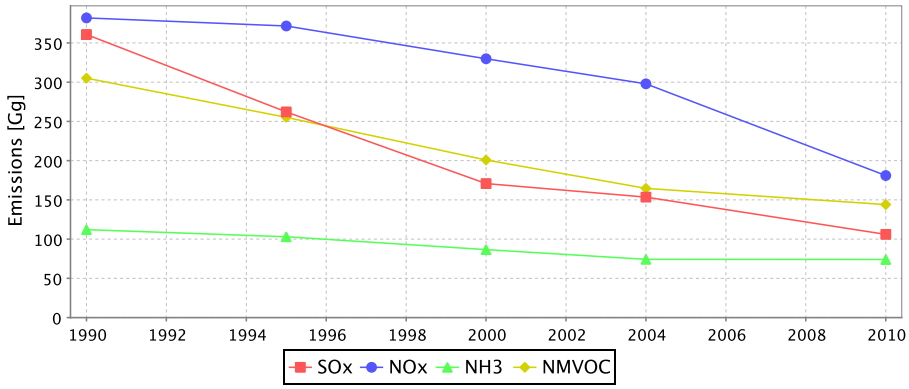

Acc. Exceedances [eq/ha/y]
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

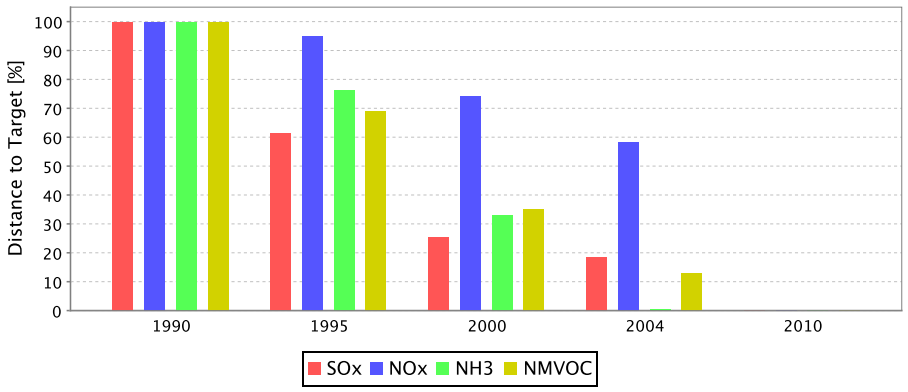

Unprotected Ecosystem Area [%]
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

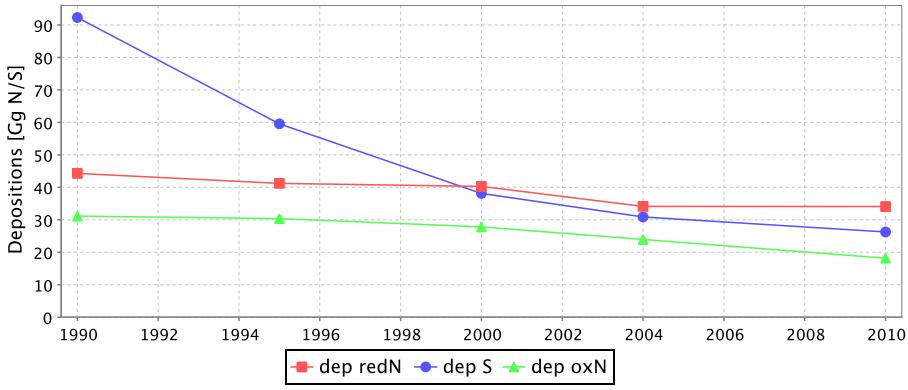

ppb.days
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

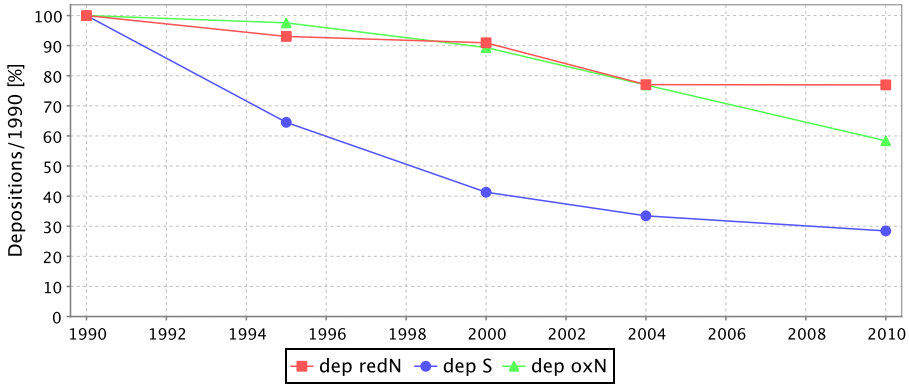

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

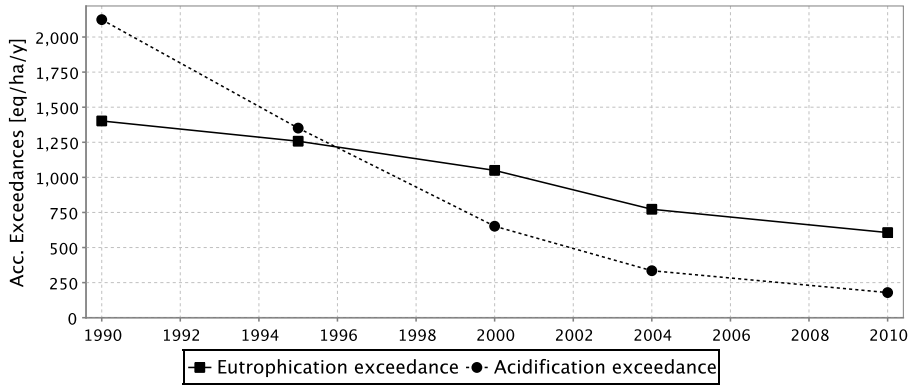
Belgium (Signatory to the Gothenburg Protocol)

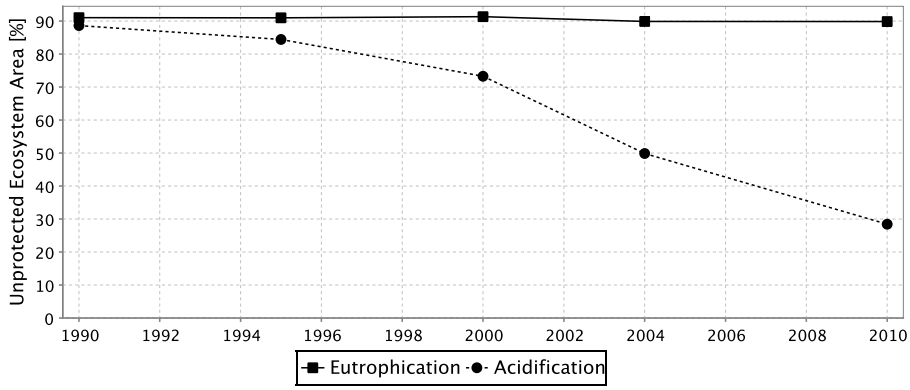


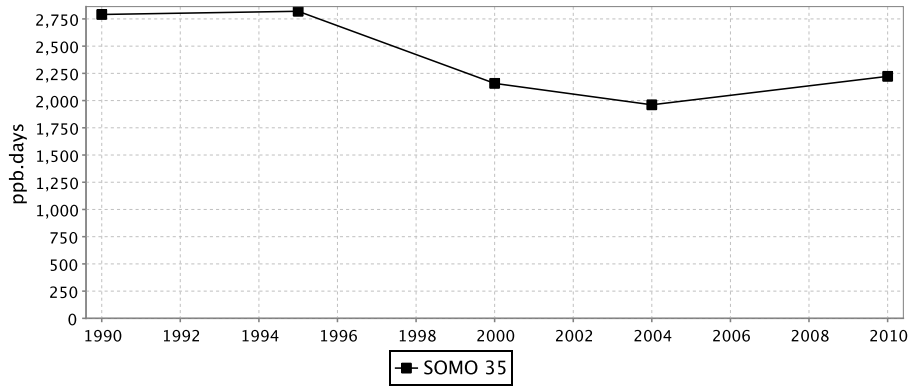


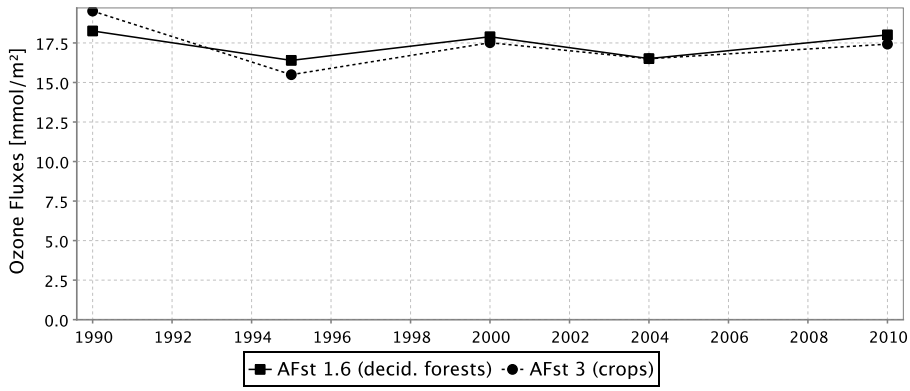




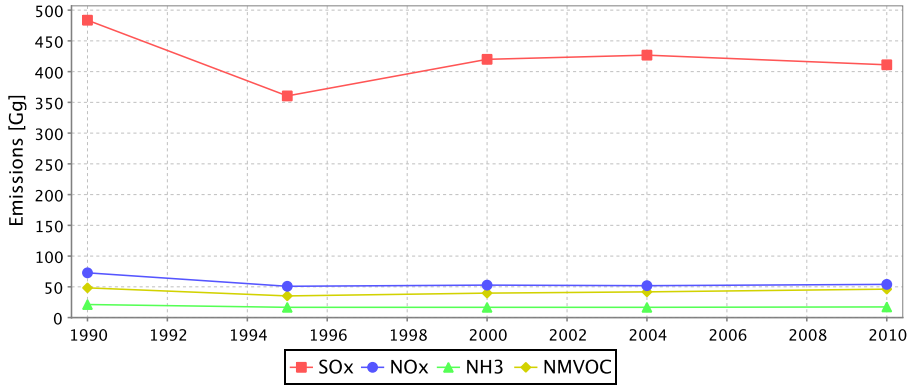

Acc. Exceedances [eq/ha/y]
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

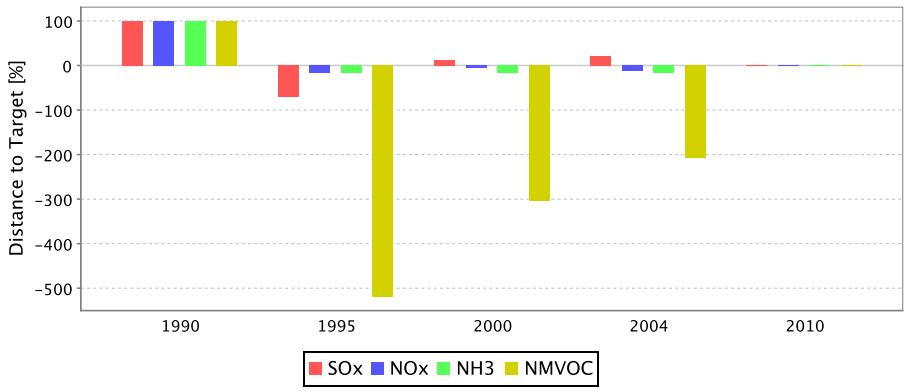

Unprotected Ecosystem Area [%]
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

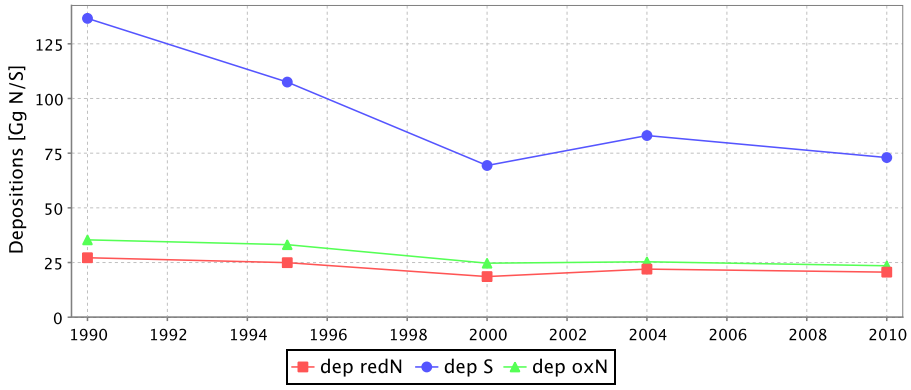

ppb.days
2,750
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

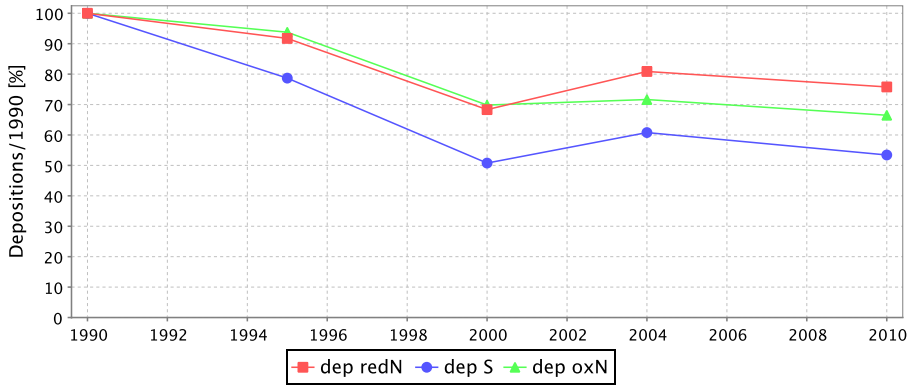

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

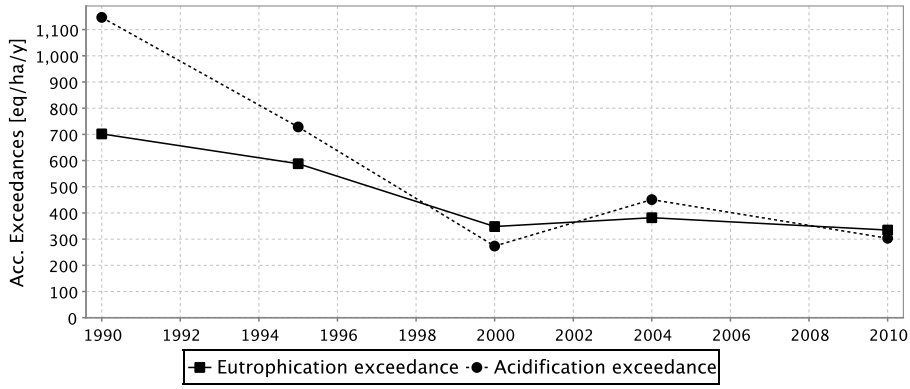
Bosnia and Herzegovina (Not included in the Gothenburg Protocol)

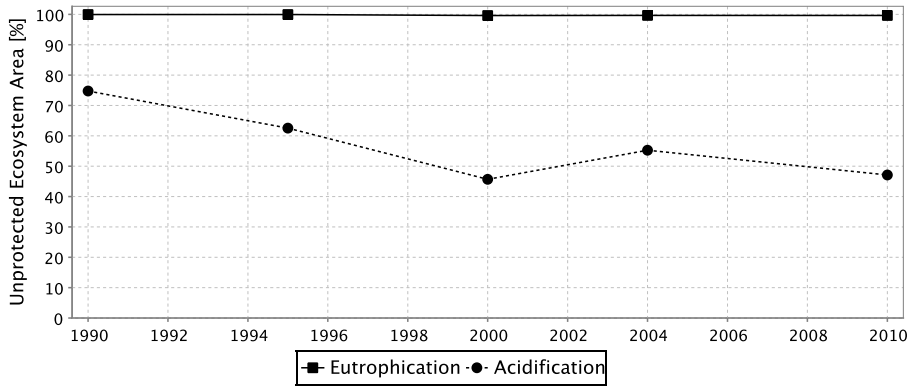


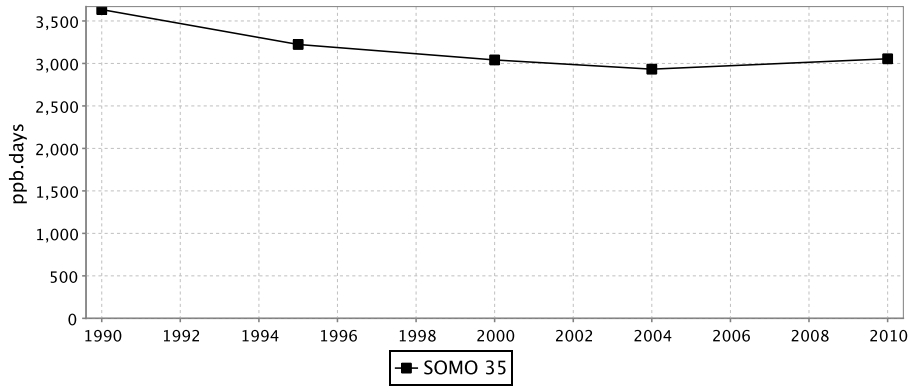


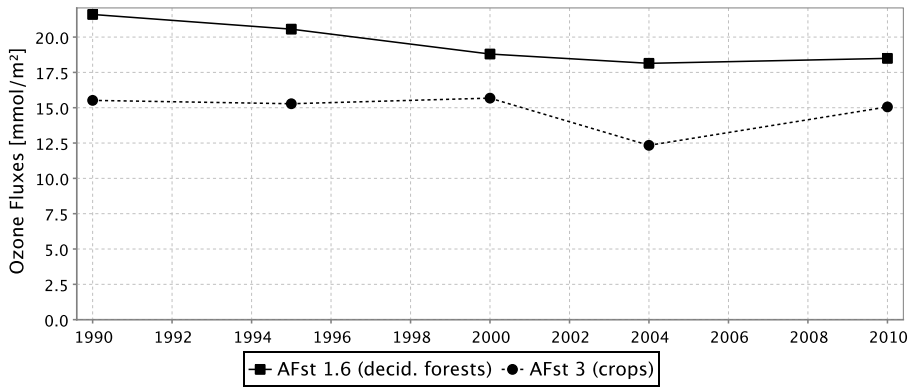




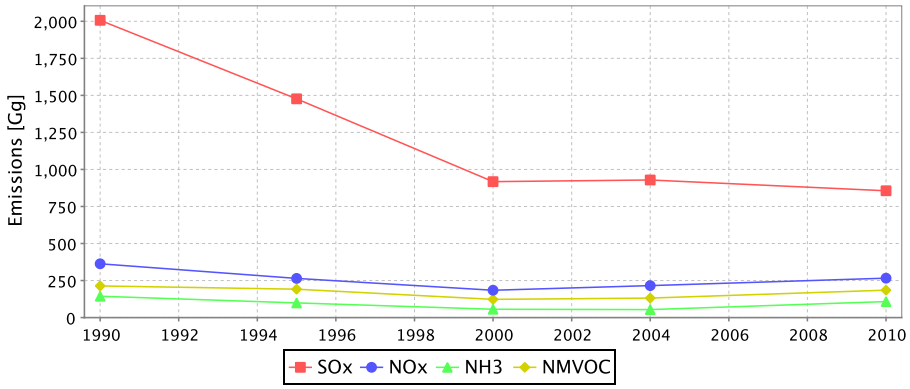

Acc. Exceedances [eq/ha/y]
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

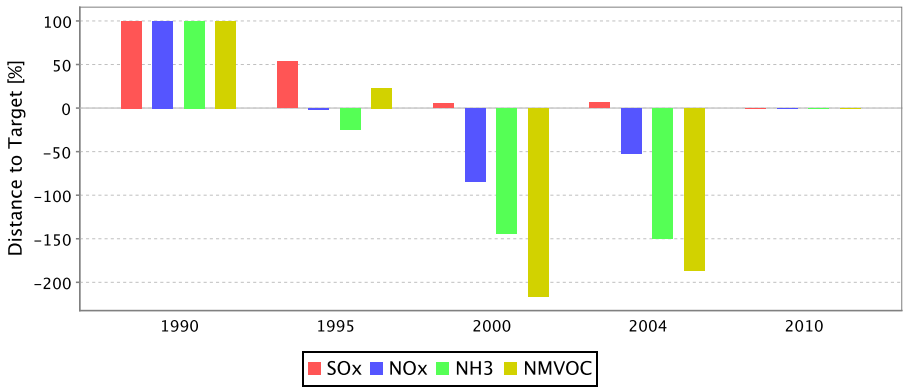

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

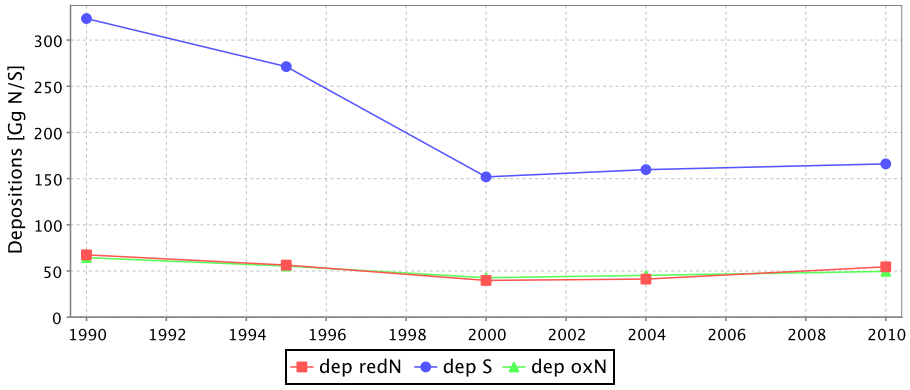

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

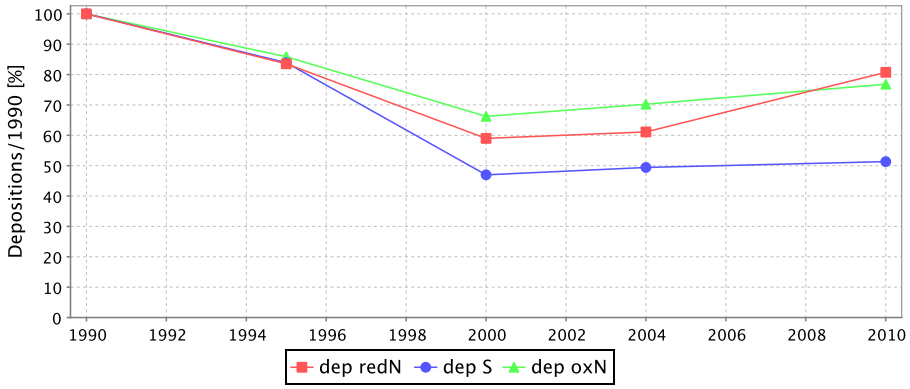

Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

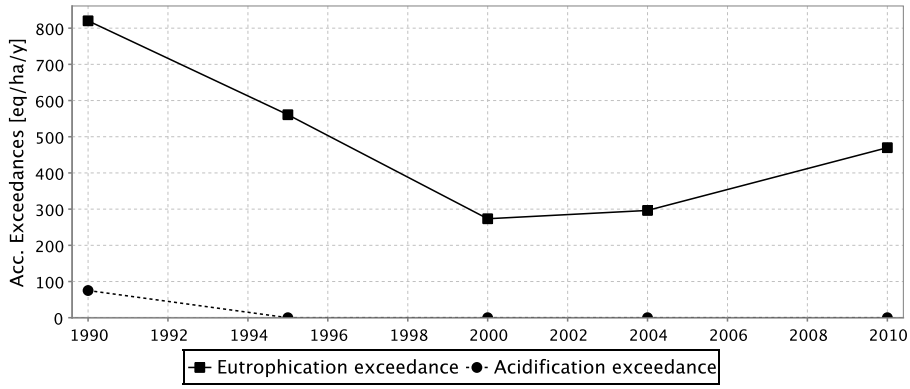
Bulgaria (Party to the Gothenburg Protocol)

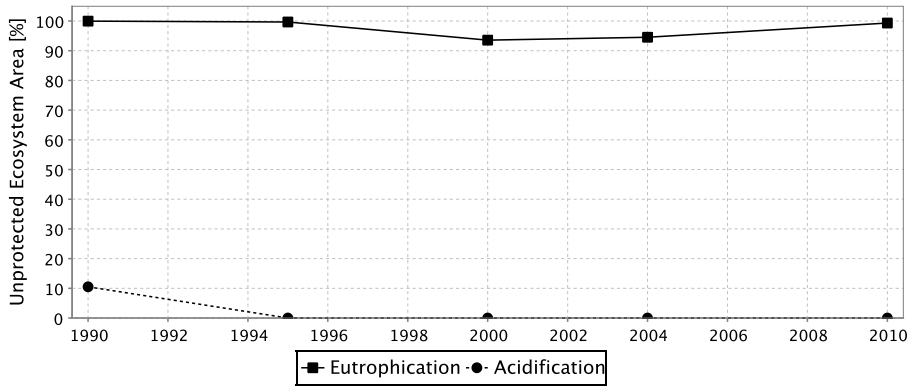


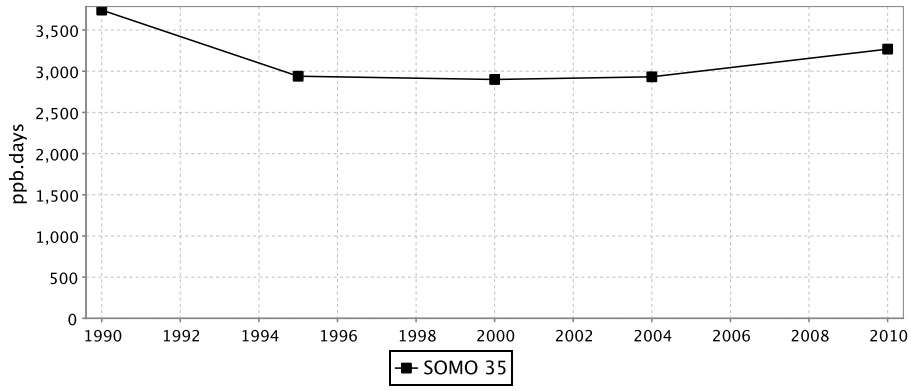


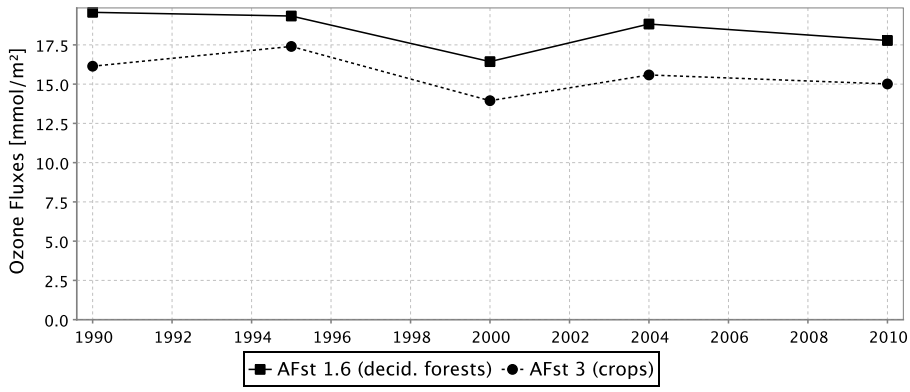




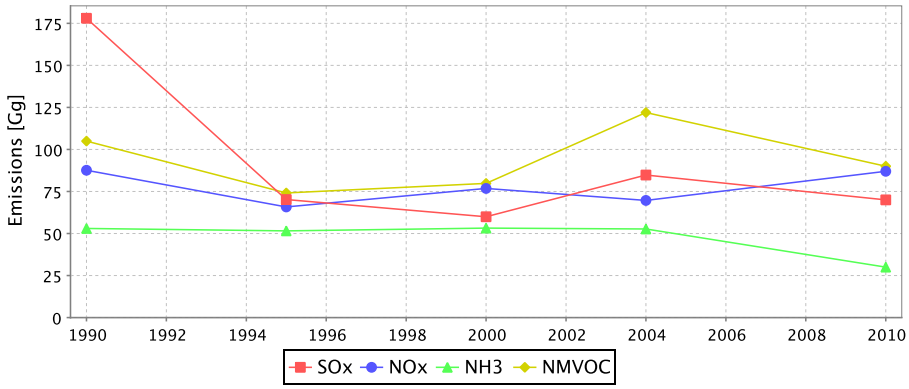

Acc. Exceedances [eq/ha/y]
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

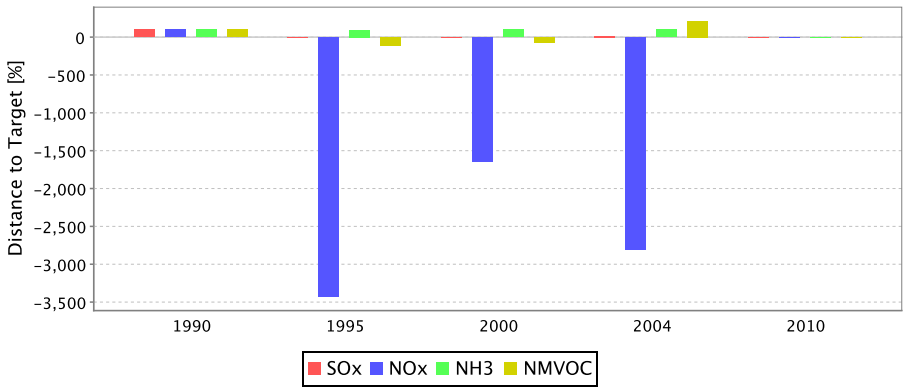

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

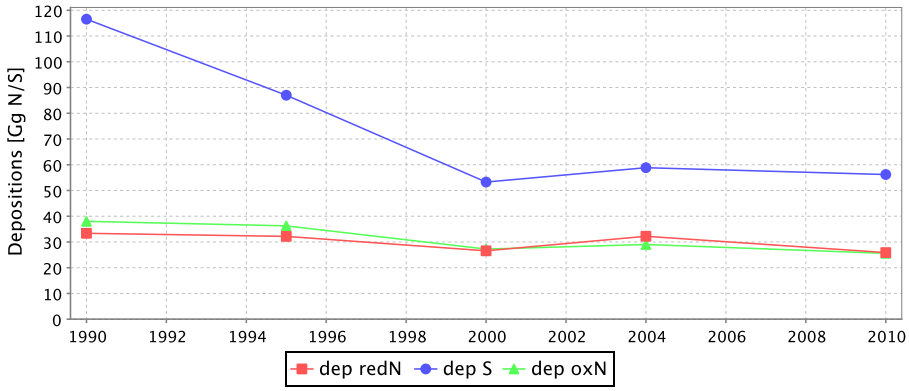

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

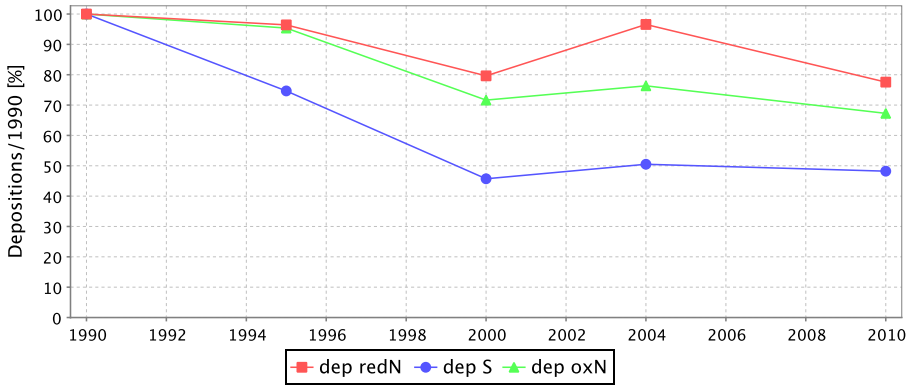

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

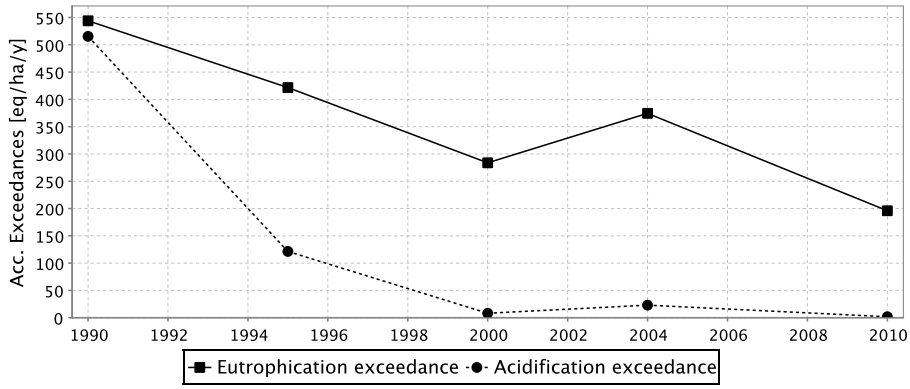
Croatia (Signatory to the Gothenburg Protocol)

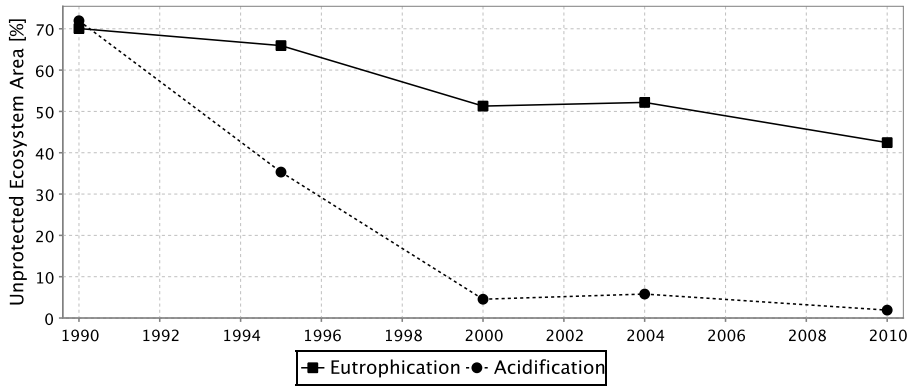


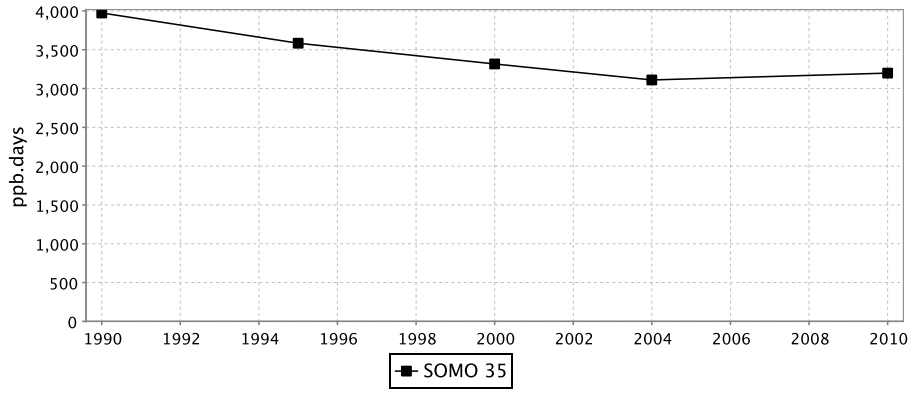


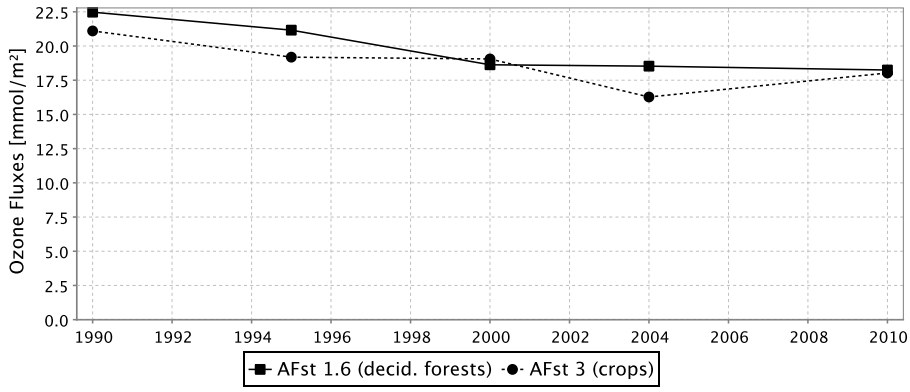




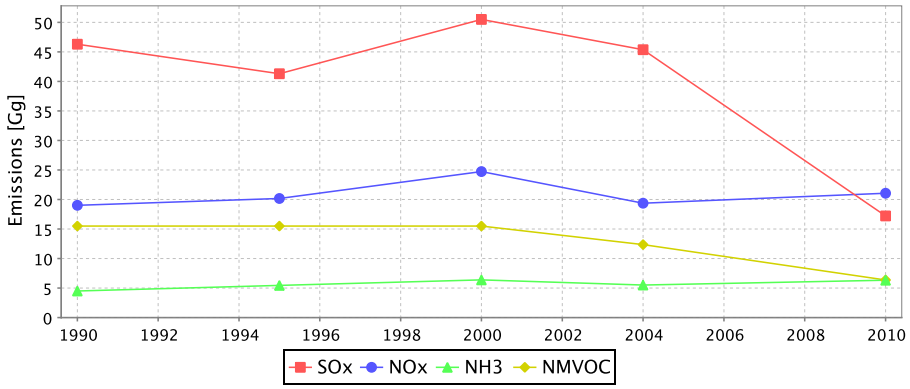

Acc. Exceedances [eq/ha/y]
550
500
450
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

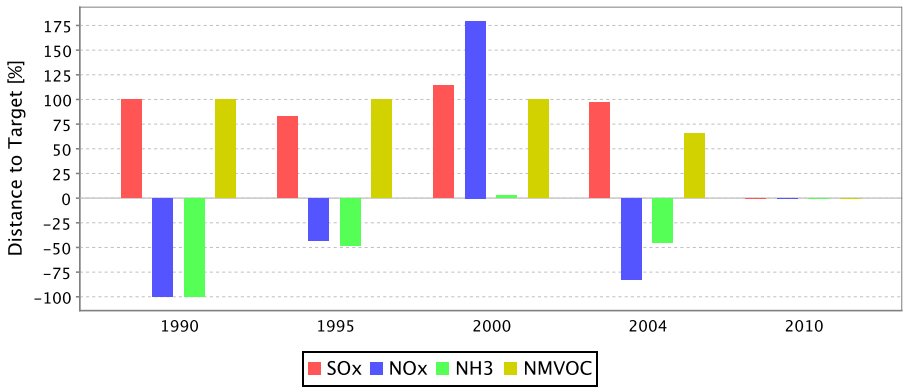

Unprotected Ecosystem Area [%]
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

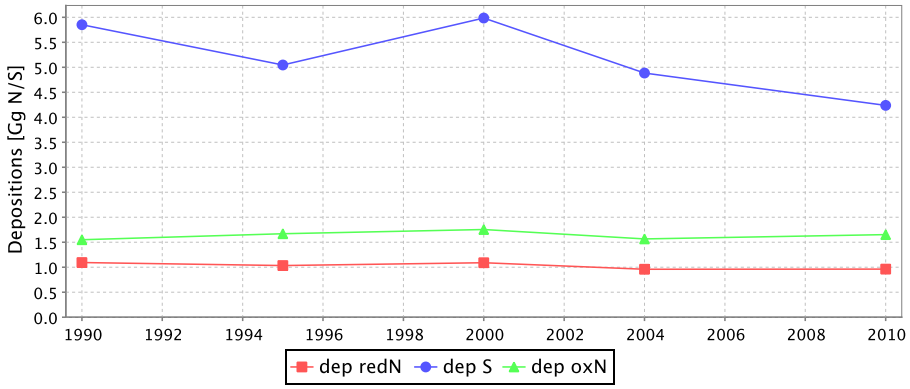

ppb.days
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

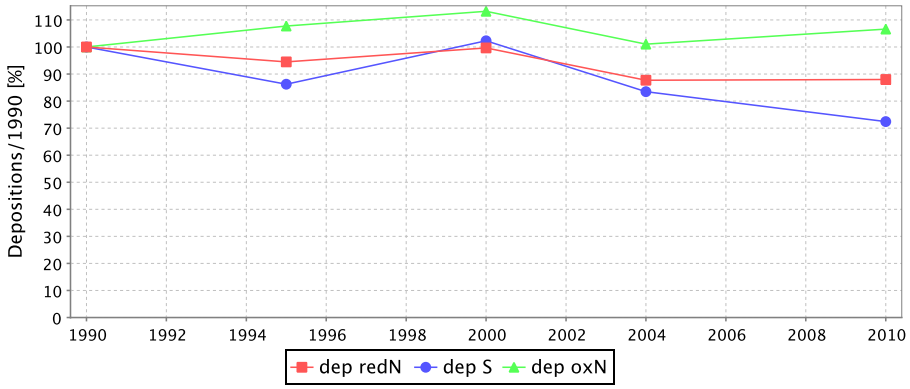

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

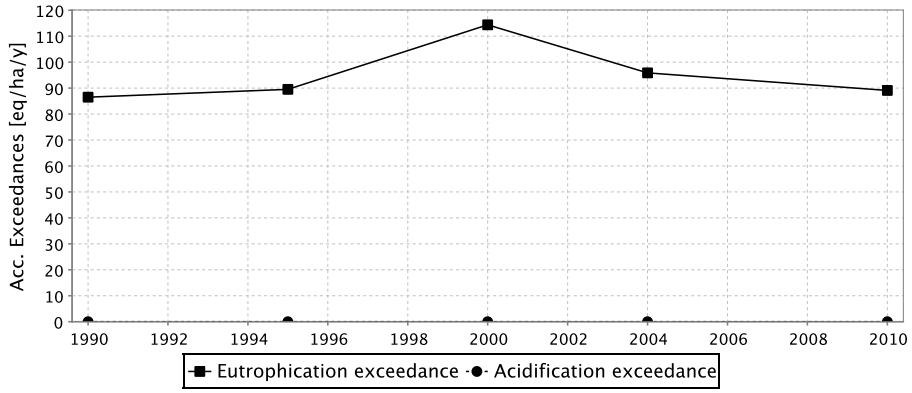
Cyprus (Non-Signatory to the Gothenburg Protocol)

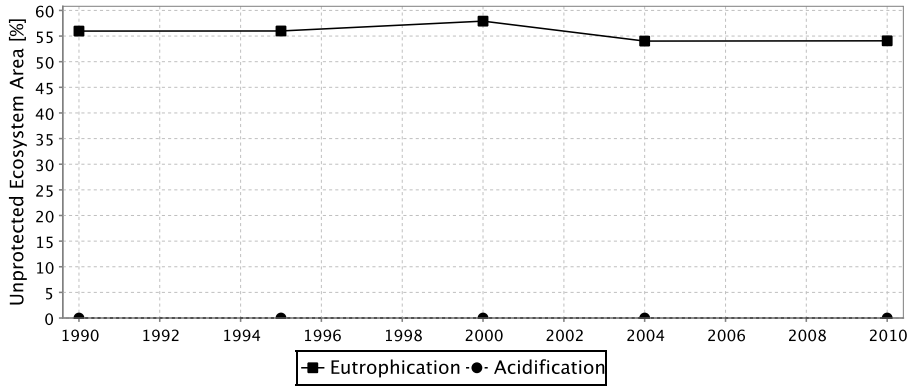


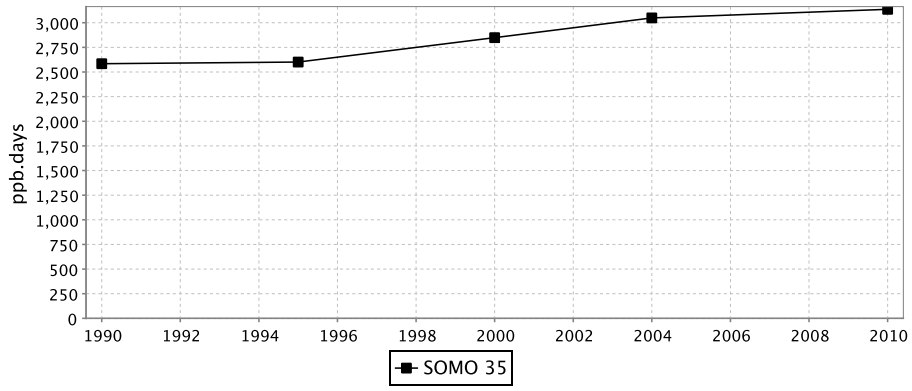


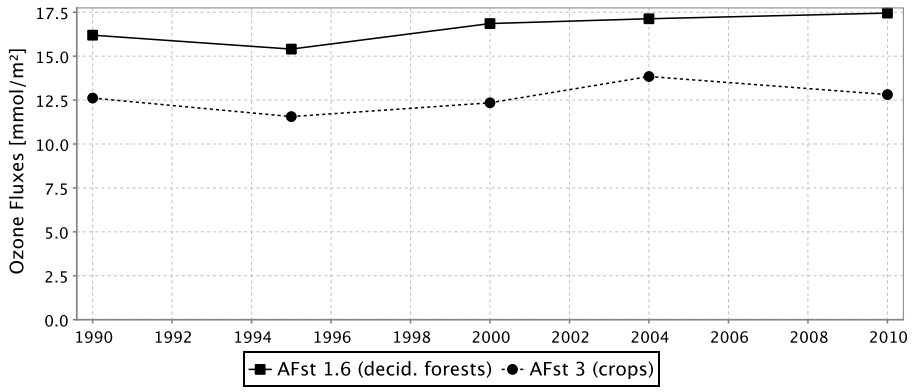




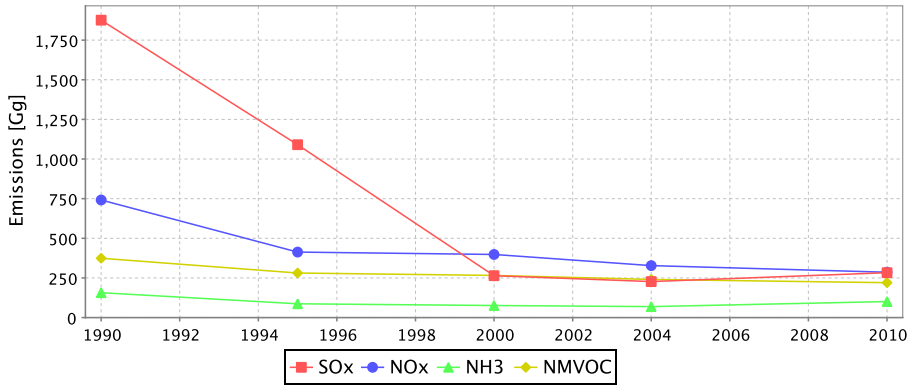

Acc. Exceedances [eq/ha/y]
120
110
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

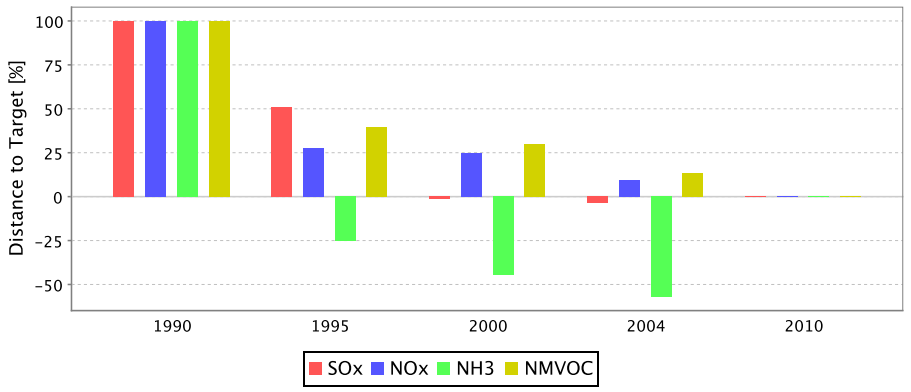

Unprotected Ecosystem Area [%]
60
55
50
45
40
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

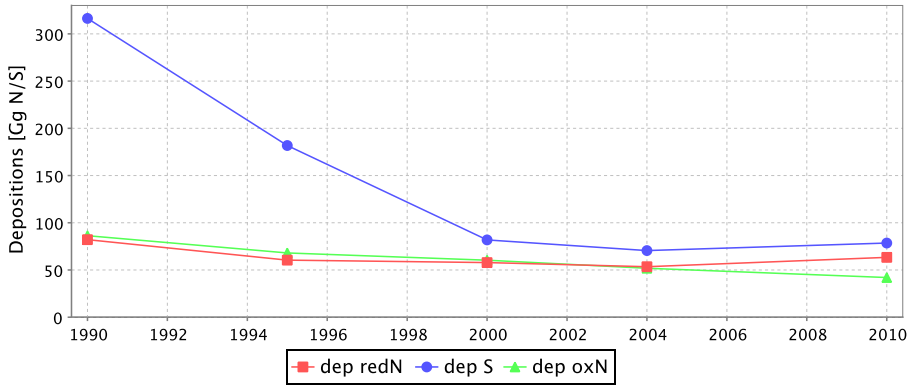

ppb.days
3,000
2,750
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

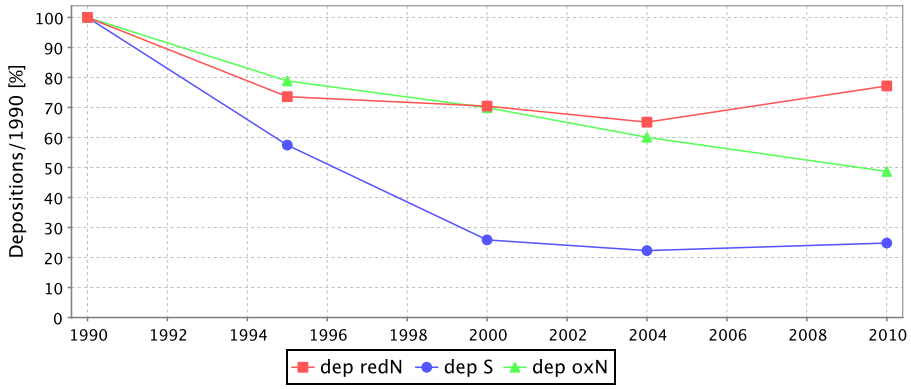

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

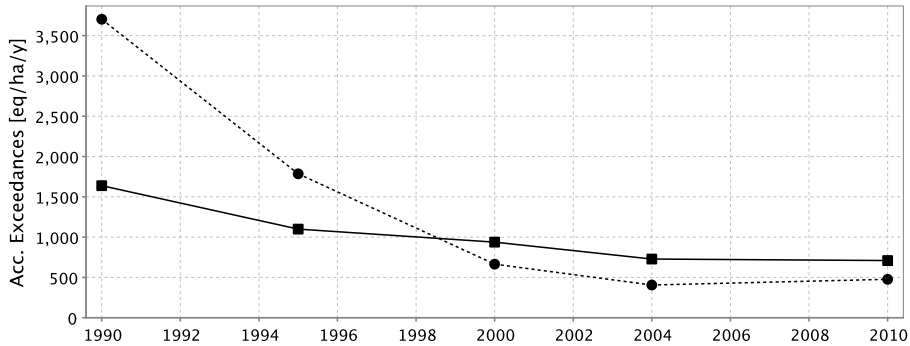
Czech Republic (Party to the Gothenburg Protocol)

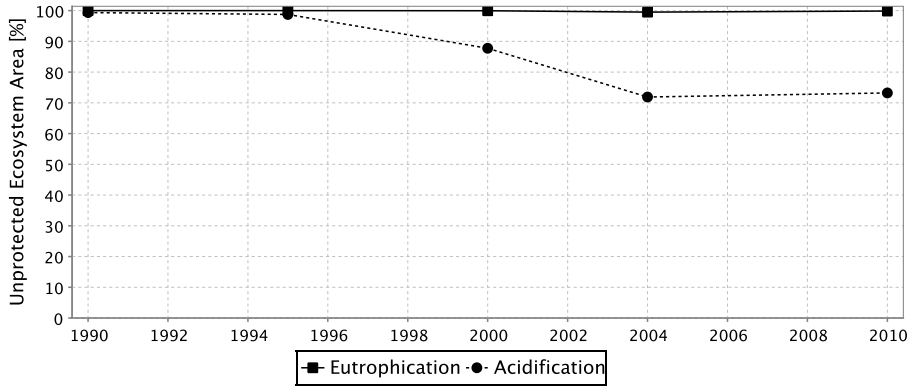


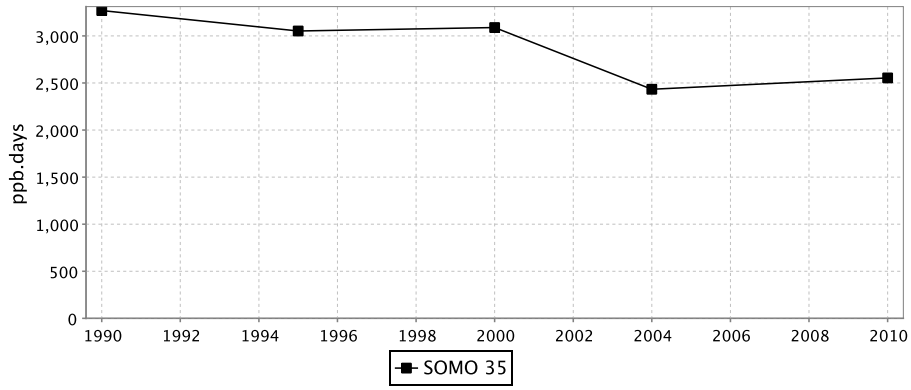


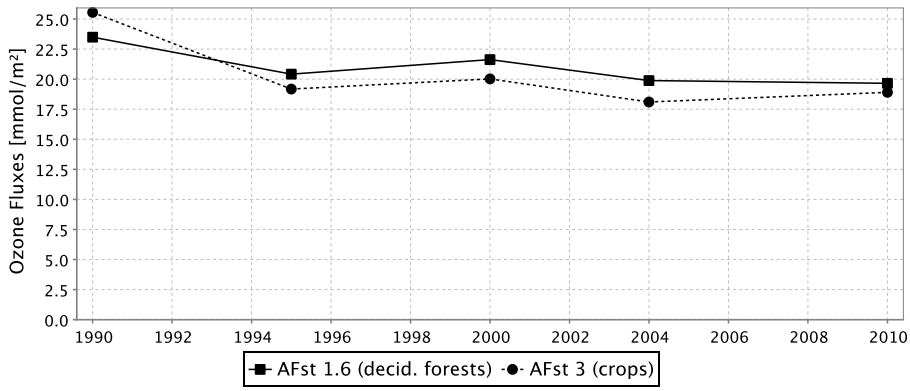




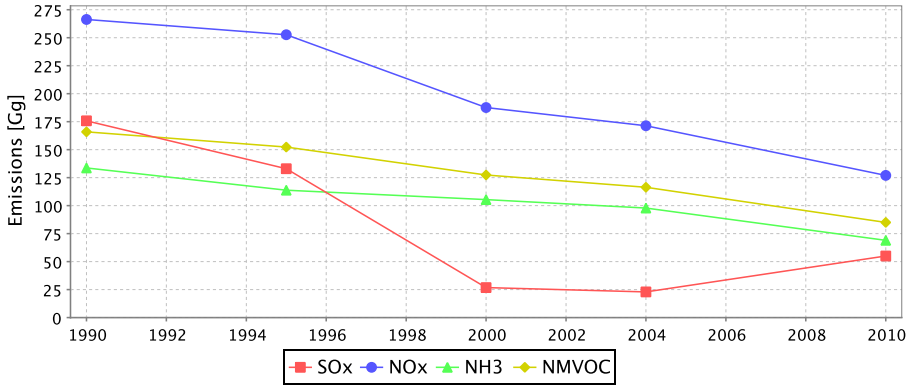

Acc. Exceedances [eq/ha/y]
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication exceedance
Acidification exceedance

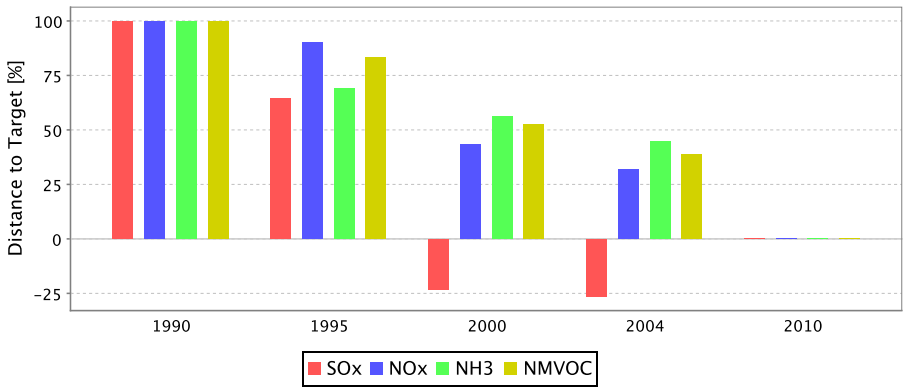

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication
Acidification

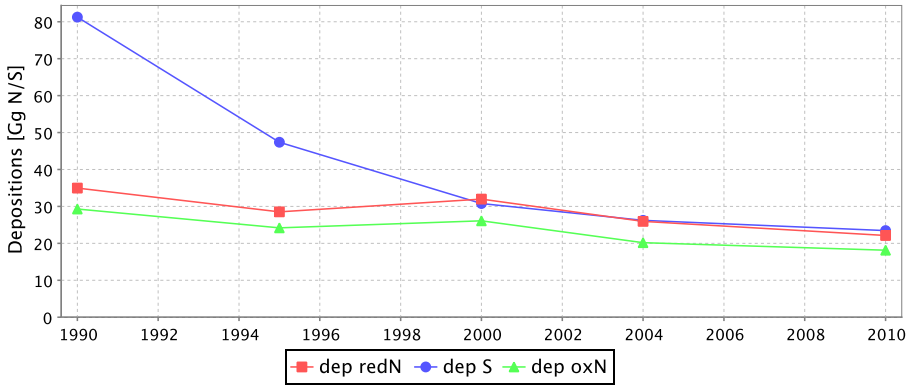

ppb.days
3,000
2,500
2,000
1,500
1,000
500
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
SOMO 35

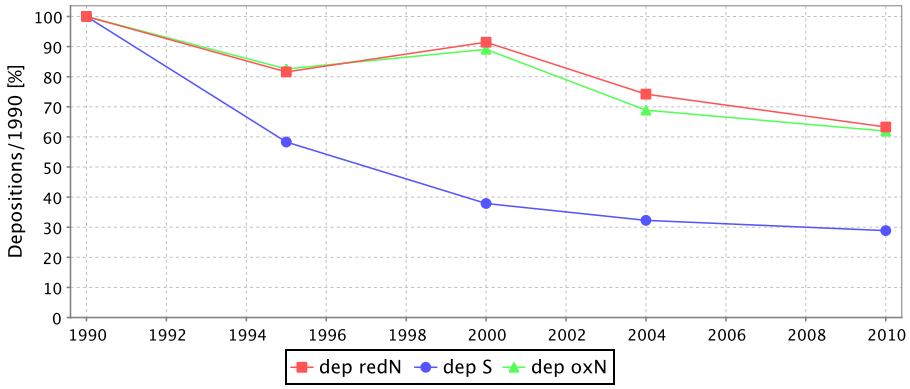

Ozone Fluxes [mmol/m²]
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

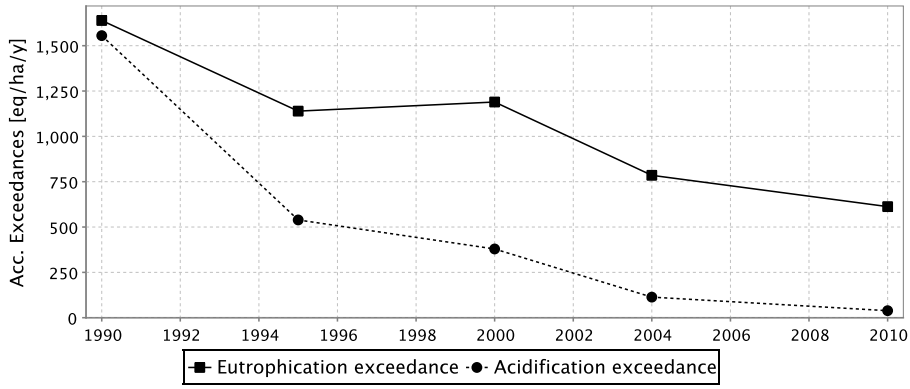
Denmark (Party to the Gothenburg Protocol)

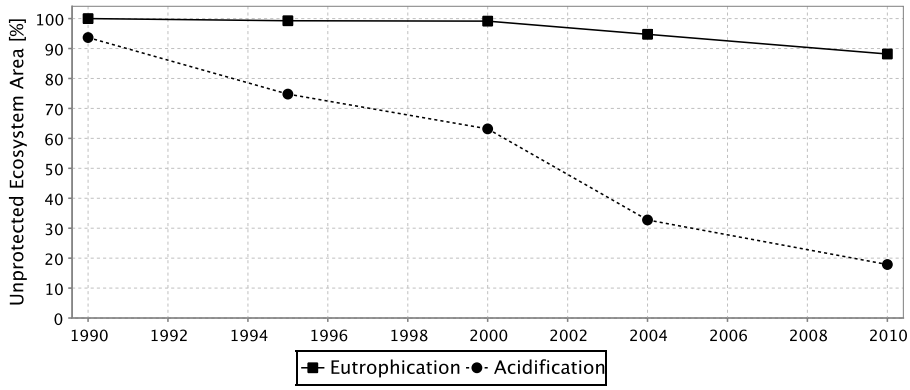


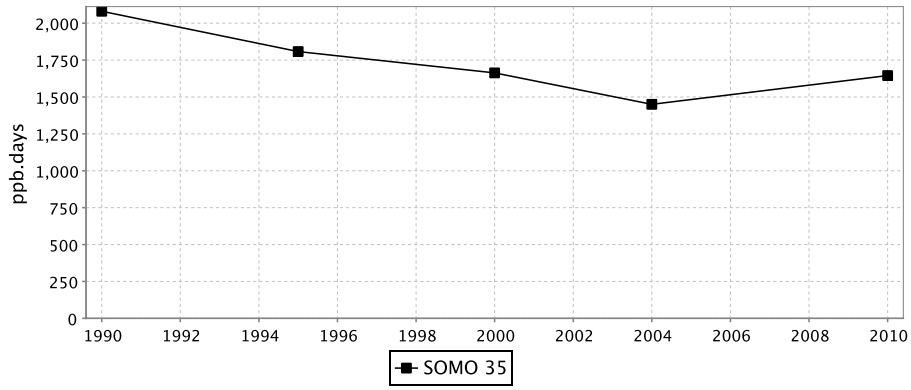


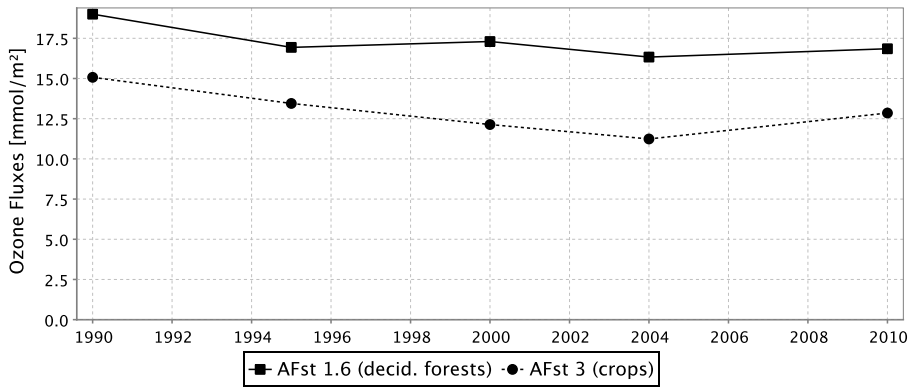




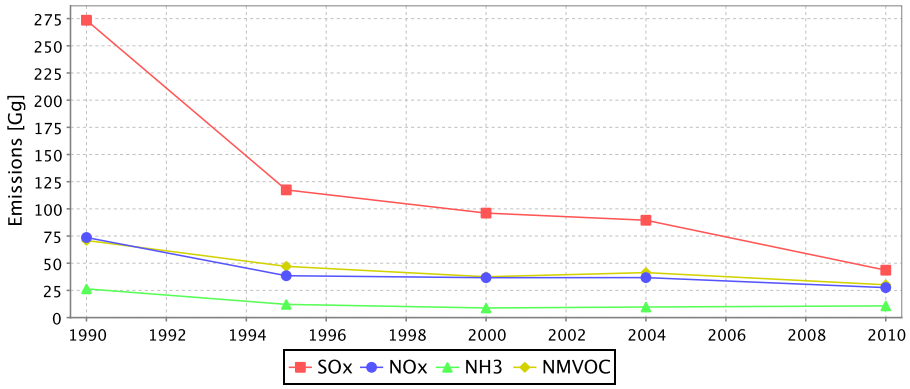

Acc. Exceedances [eq/ha/y]
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

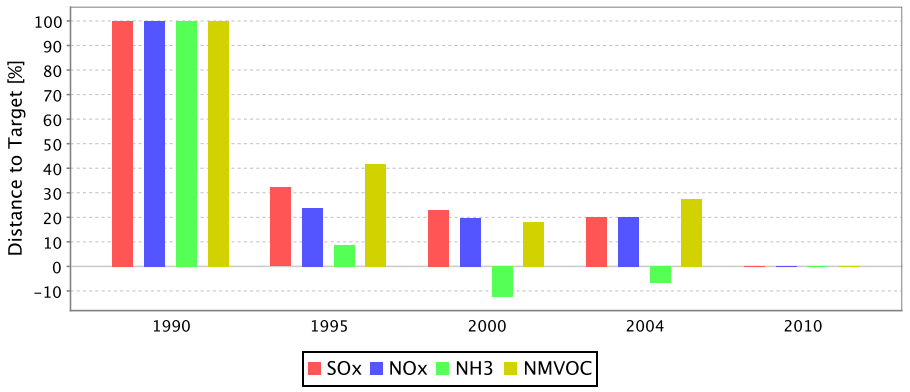

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

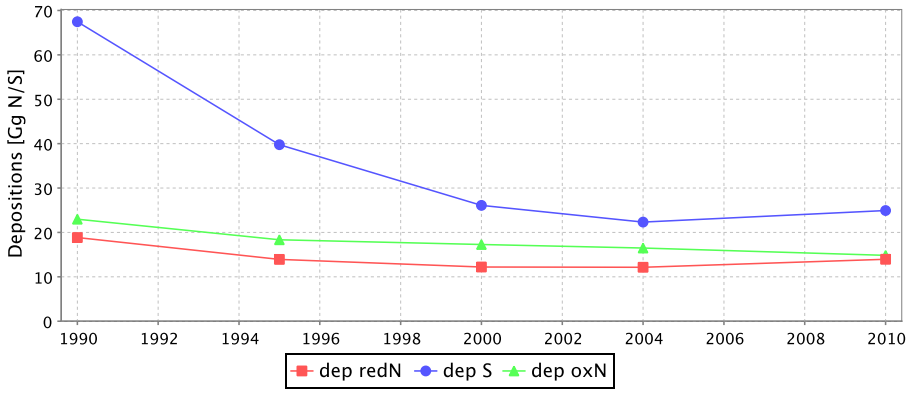

ppb.days
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

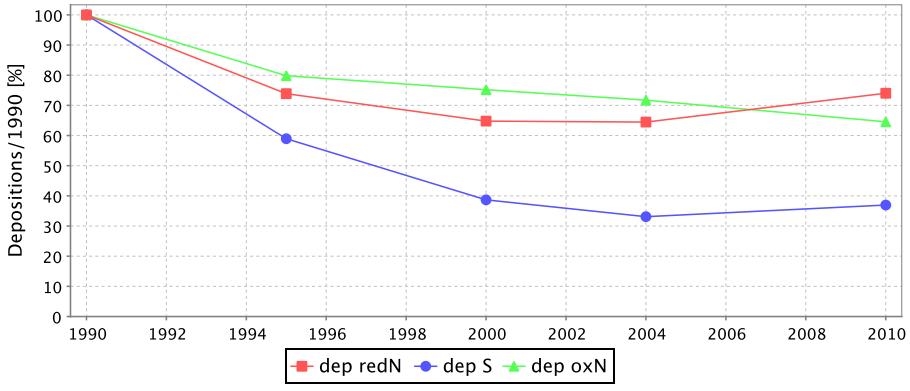

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

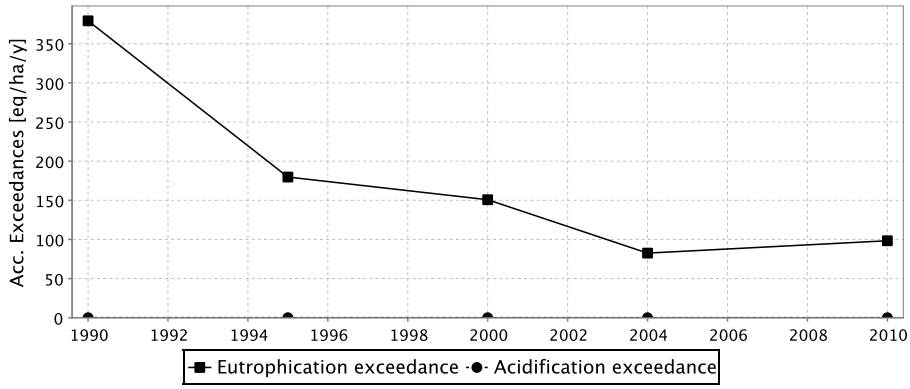
Estonia (Not included in the Gothenburg Protocol)

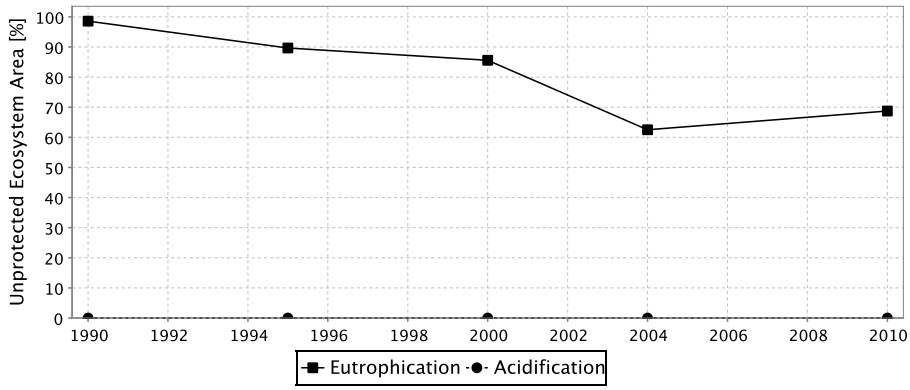


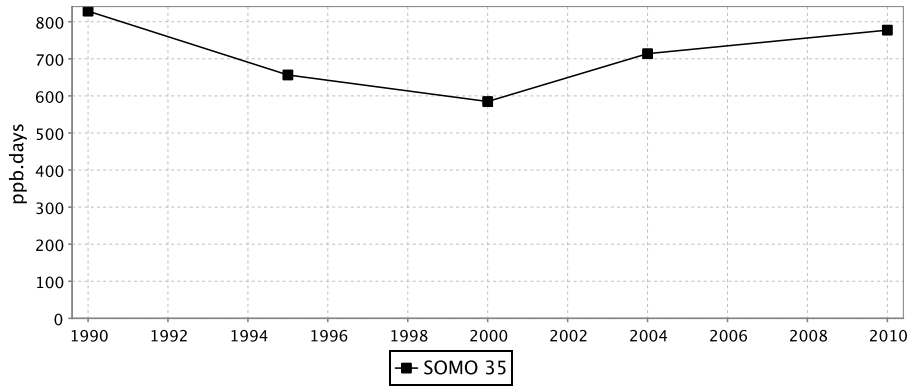


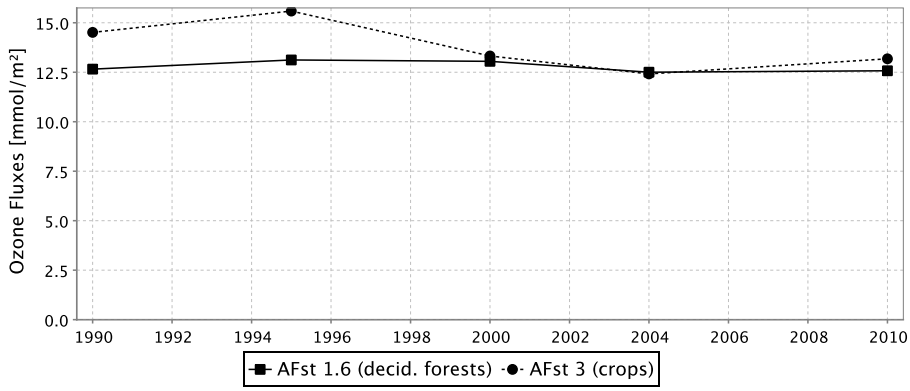




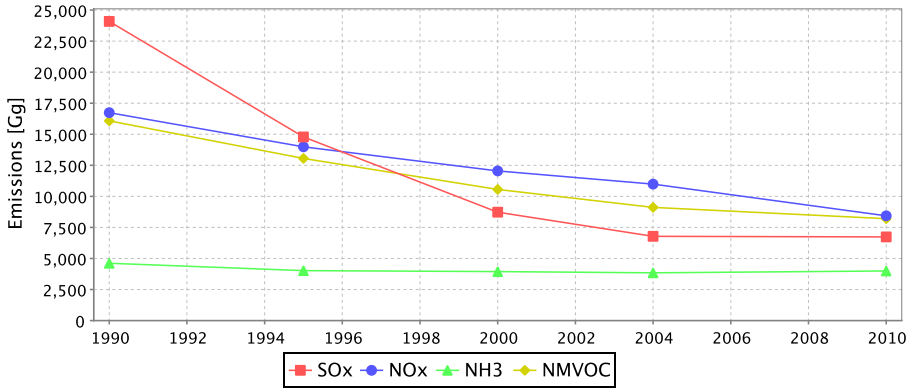

Acc. Exceedances [eq/ha/y]
0
50
100
150
200
250
300
350
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

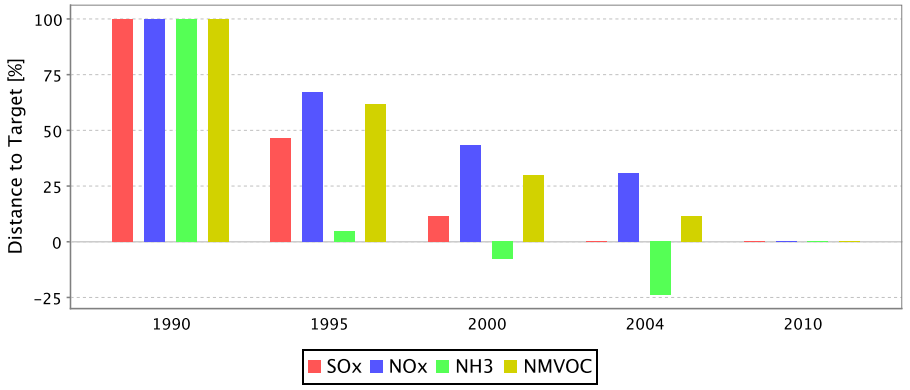

Unprotected Ecosystem Area [%]
0
10
20
30
40
50
60
70
80
90
100
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

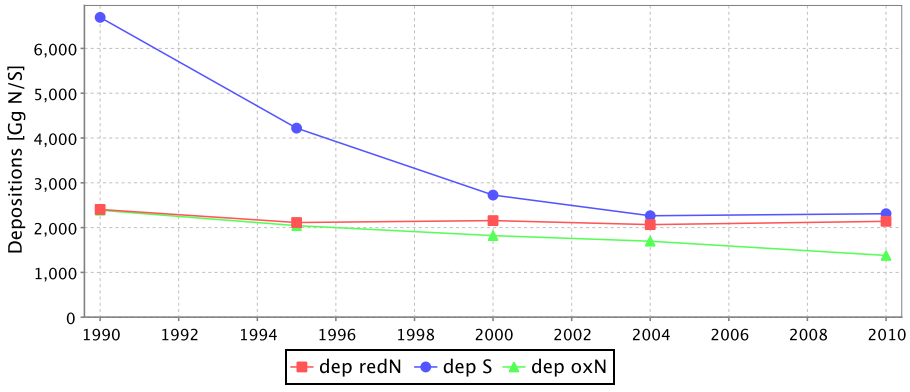

ppb.days
0
100
200
300
400
500
600
700
800
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

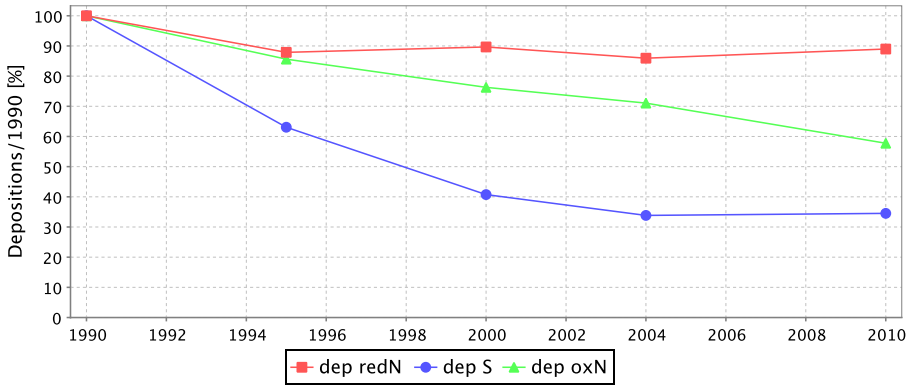

Ozone Fluxes [mmol/m²]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

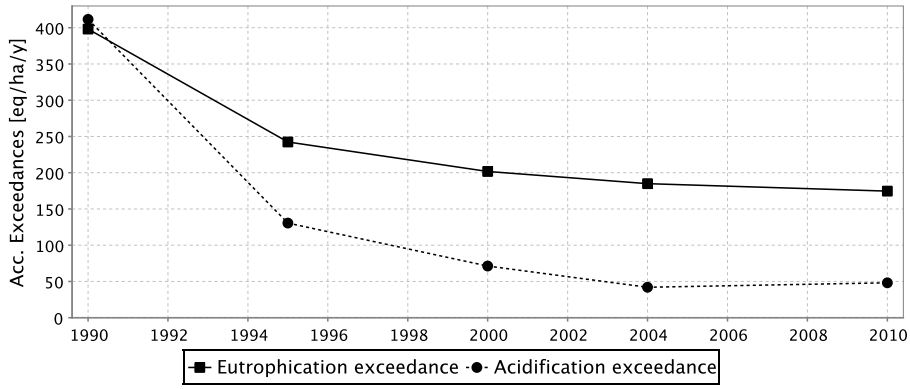
The European Community (Party to the Gothenburg Protocol), here as EU25

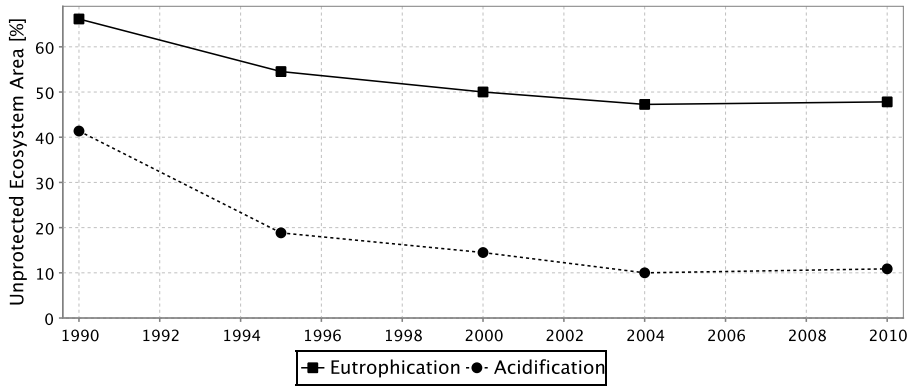


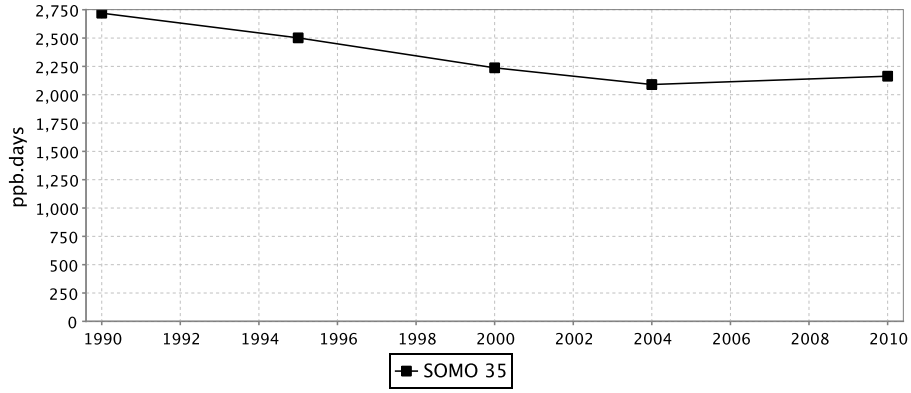


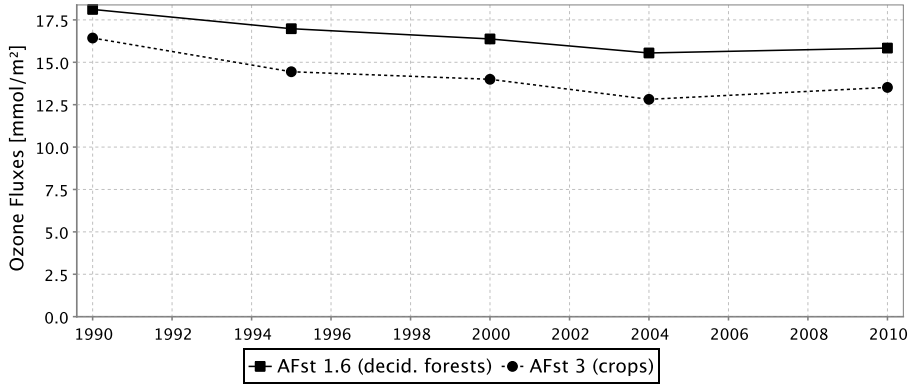




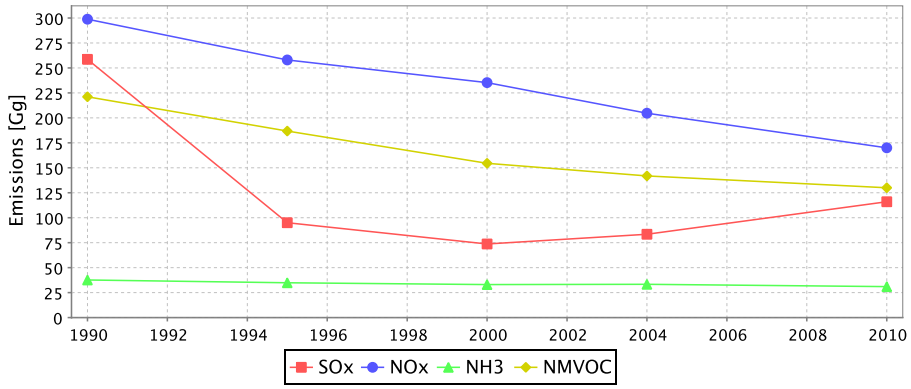

Acc. Exceedances [eq/ha/y]
0
50
100
150
200
250
300
350
400
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

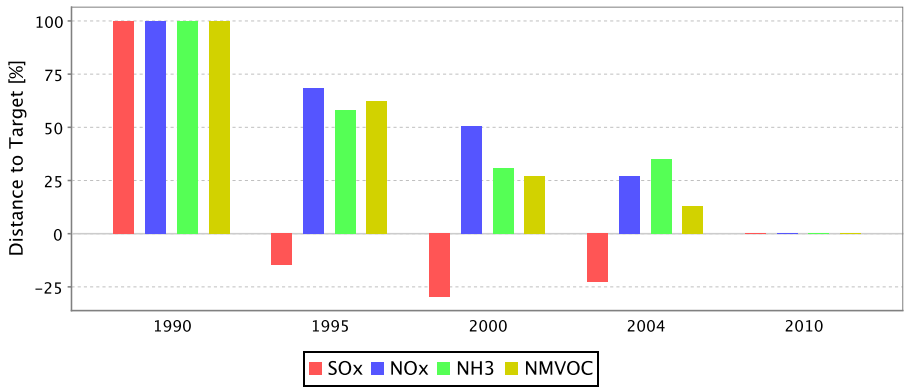

Unprotected Ecosystem Area [%]
0
10
20
30
40
50
60
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

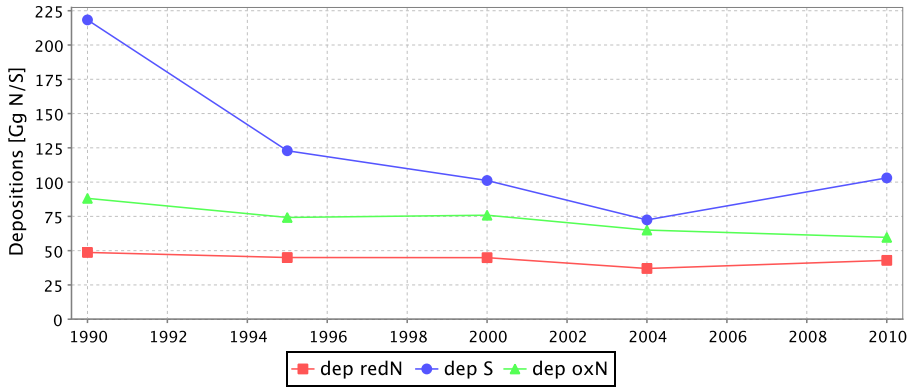

ppb.days
0
250
500
750
1,000
1,250
1,500
1,750
2,000
2,250
2,500
2,750
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

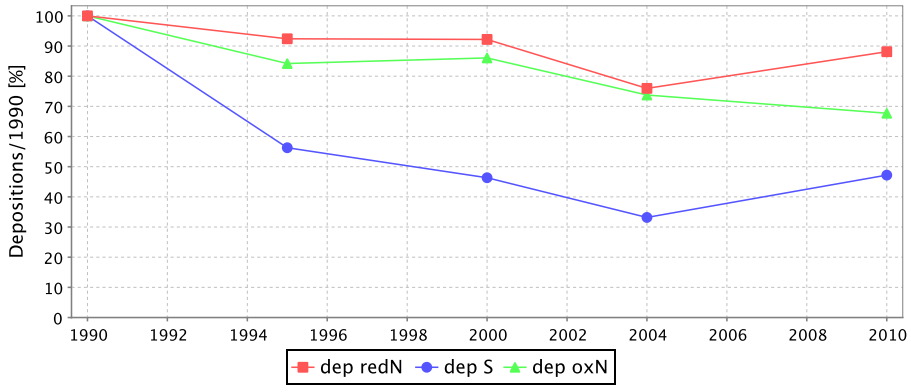

Ozone Fluxes [mmol/m²]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

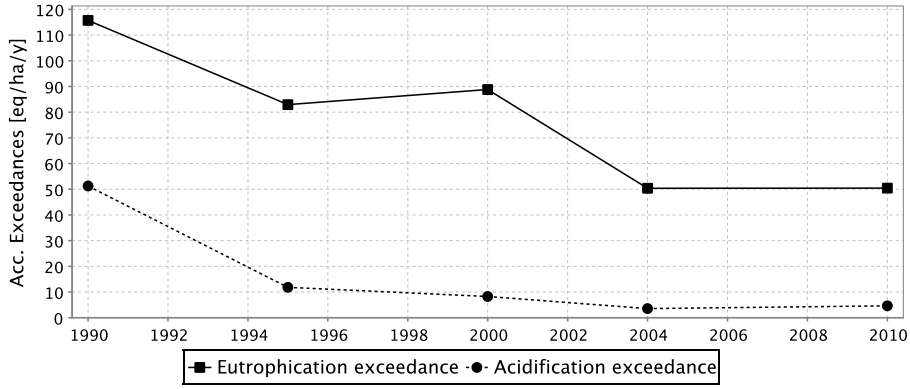
Finland (Party to the Gothenburg Protocol)

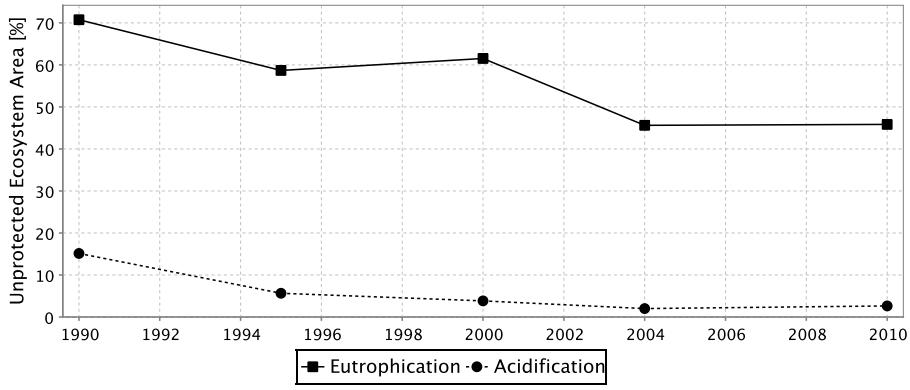


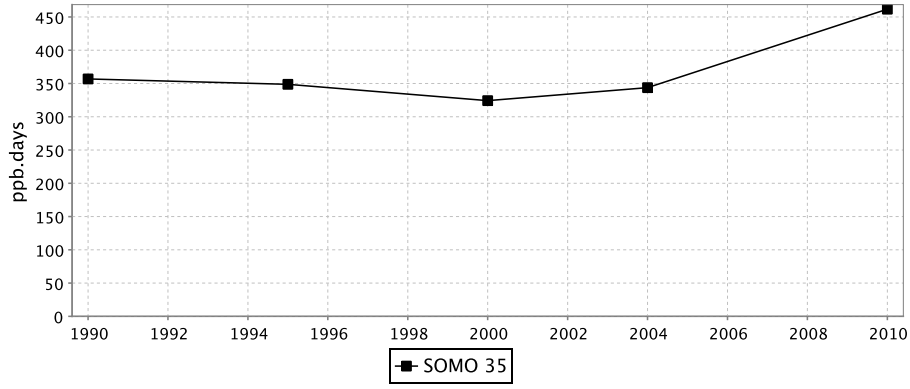


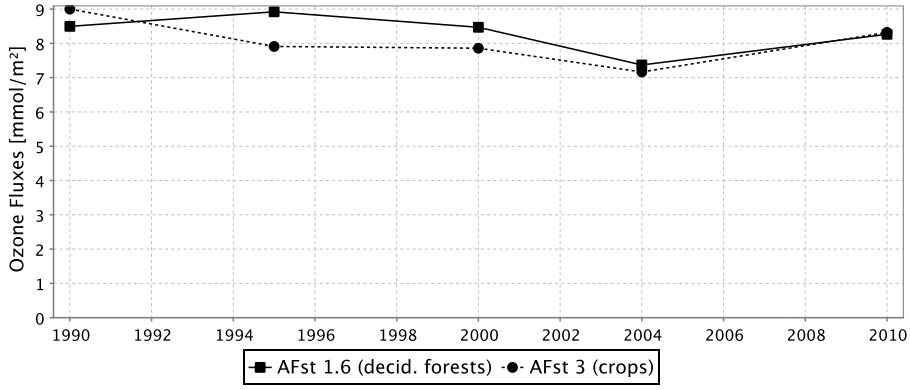




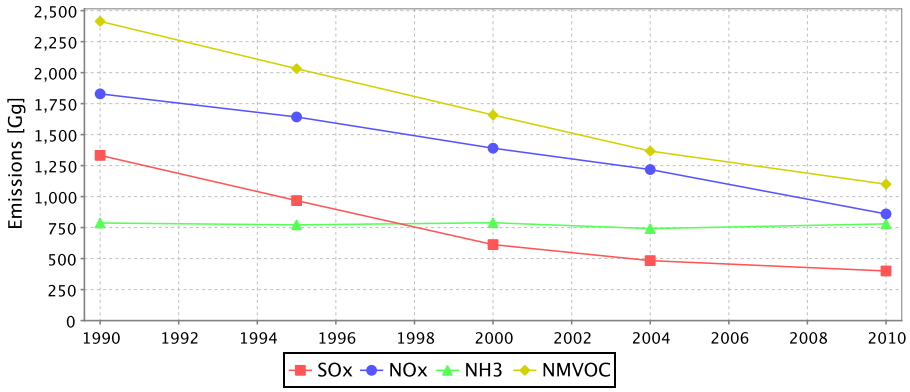

Acc. Exceedances [eq/ha/y]
120
110
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

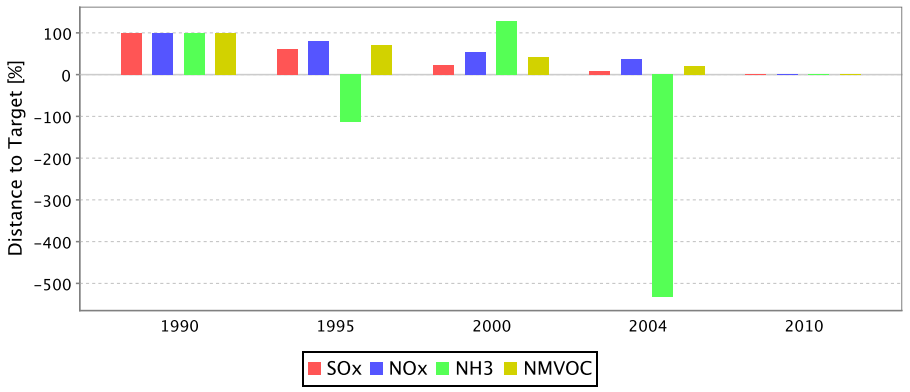

Unprotected Ecosystem Area [%]
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

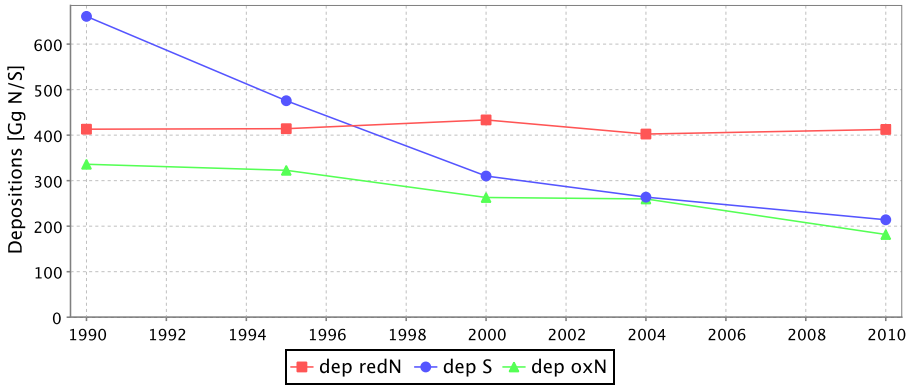

ppb.days
450
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

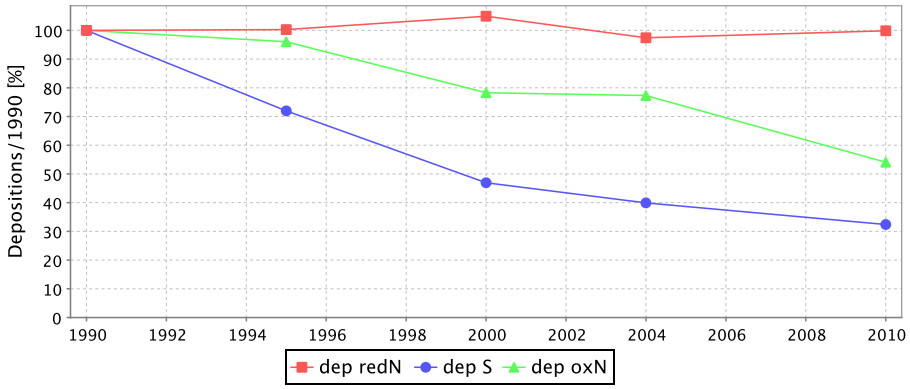

Ozone Fluxes [mmol/m²]
9
8
7
6
5
4
3
2
1
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

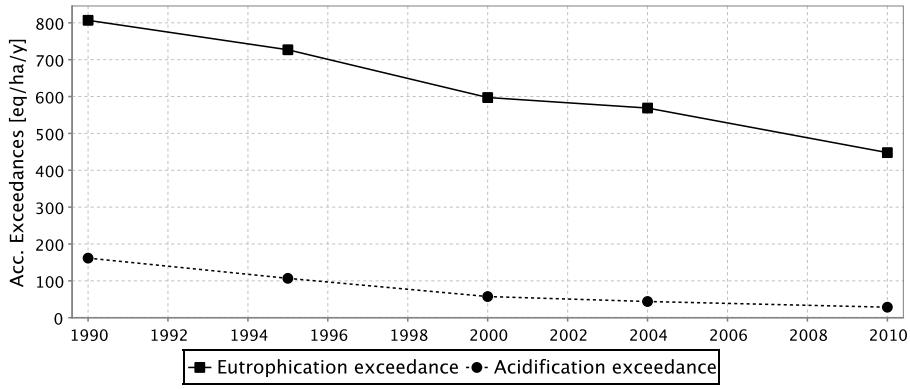
France (Signatory to the Gothenburg Protocol)

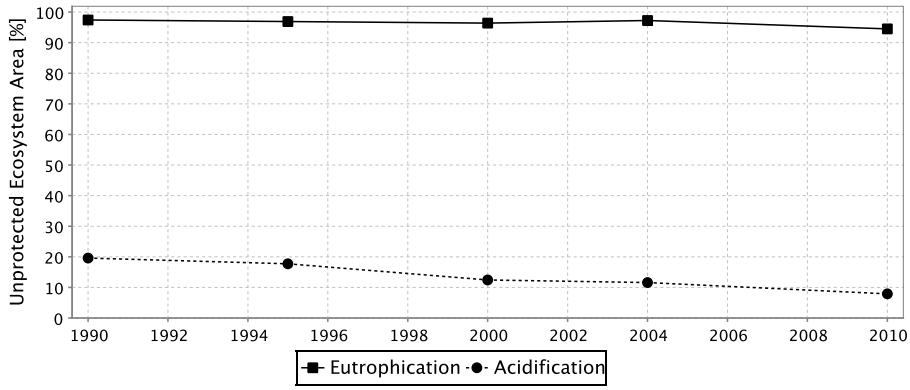


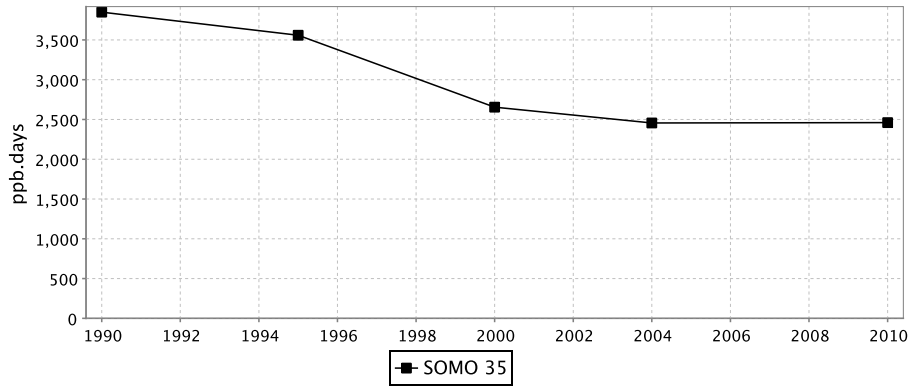


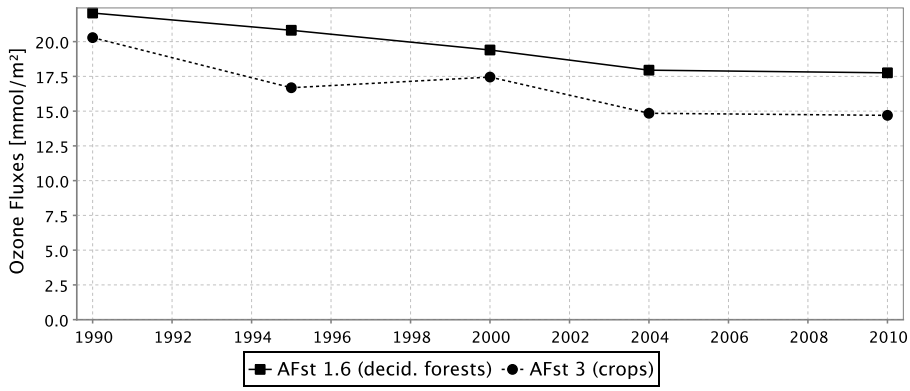




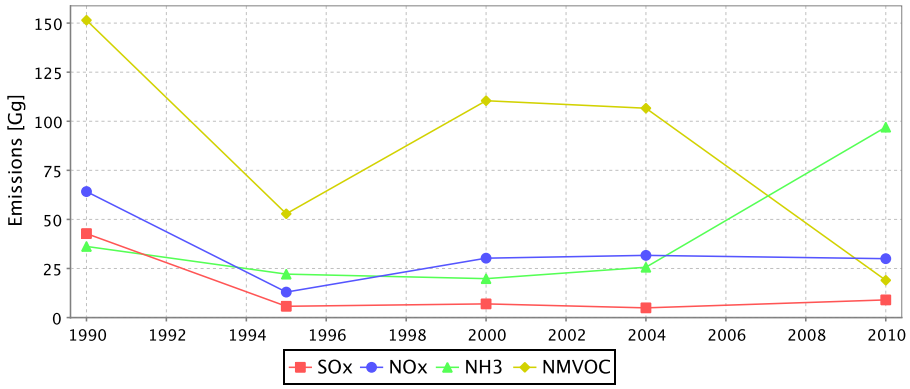

Acc. Exceedances [eq/ha/y]
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

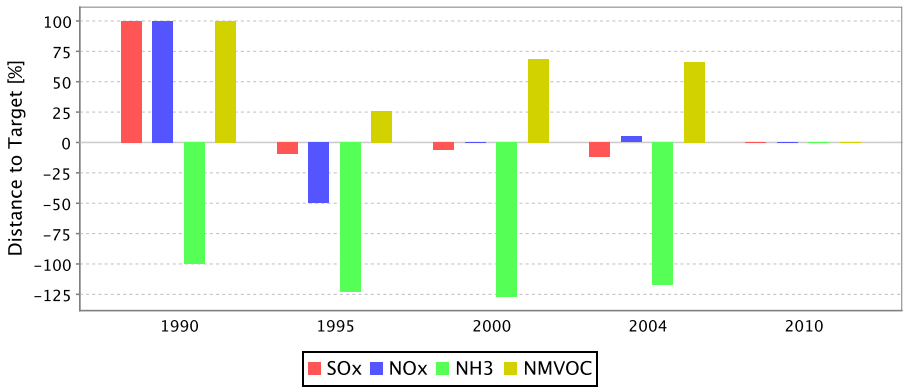

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

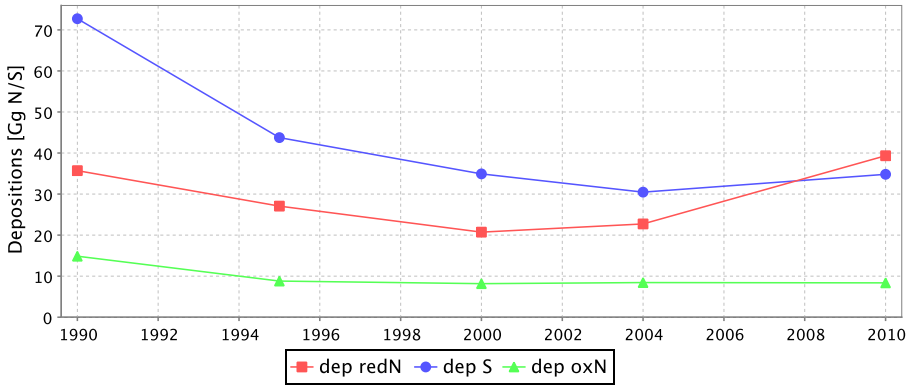

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

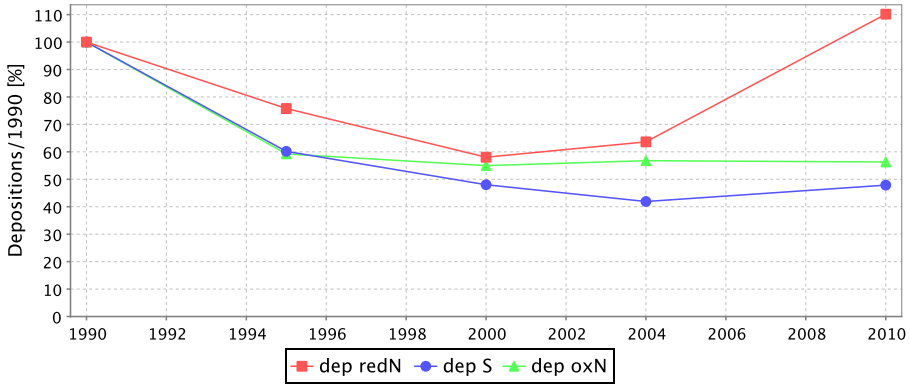

Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

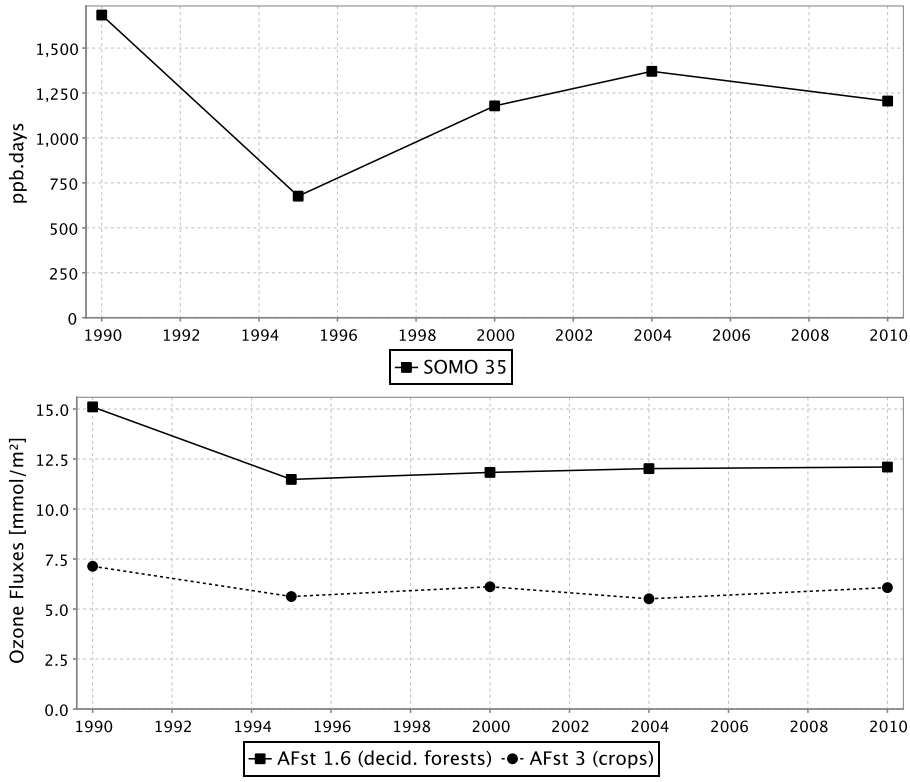
Georgia (Not included in the Gothenburg Protocol)



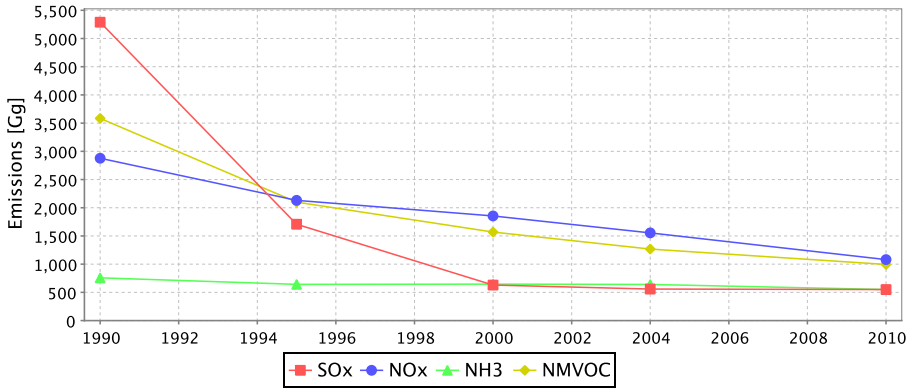


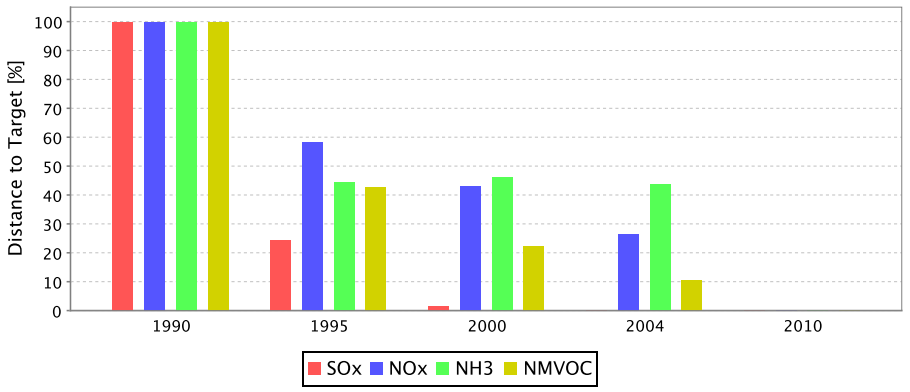


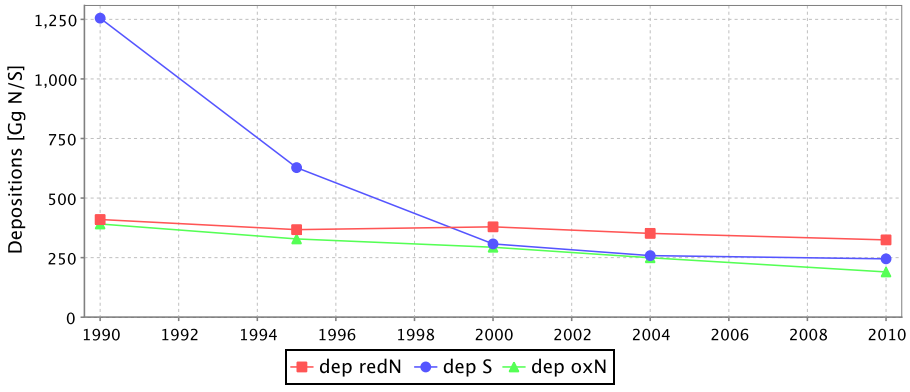


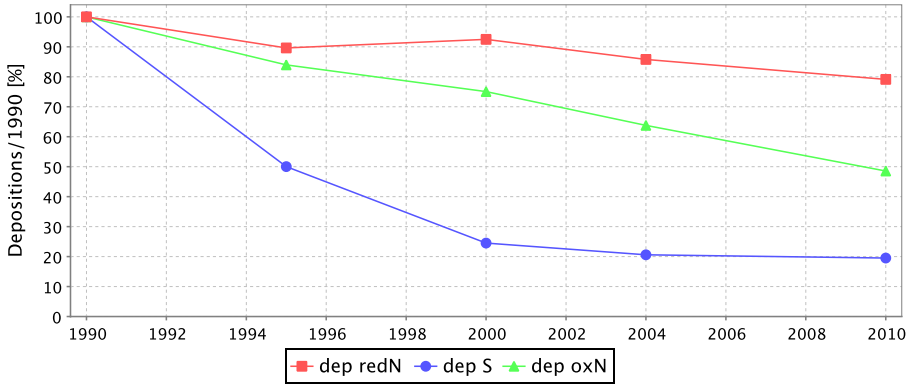

ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

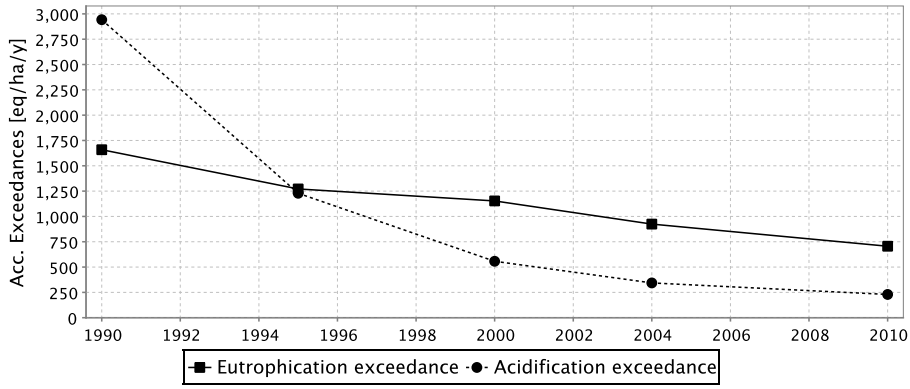
Germany (Party to the Gothenburg Protocol)

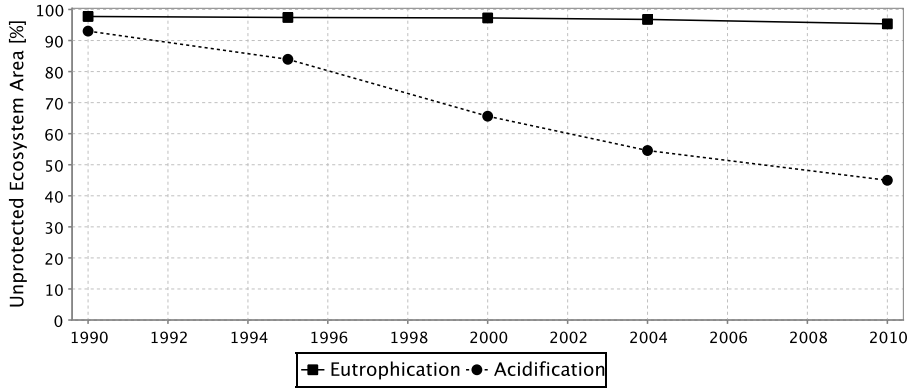


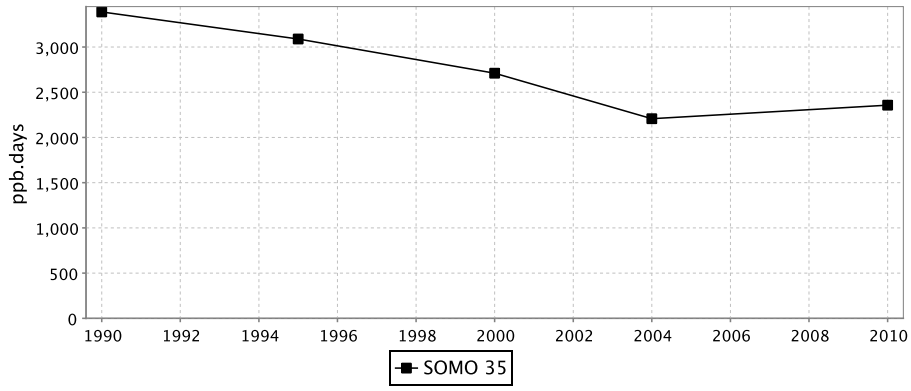


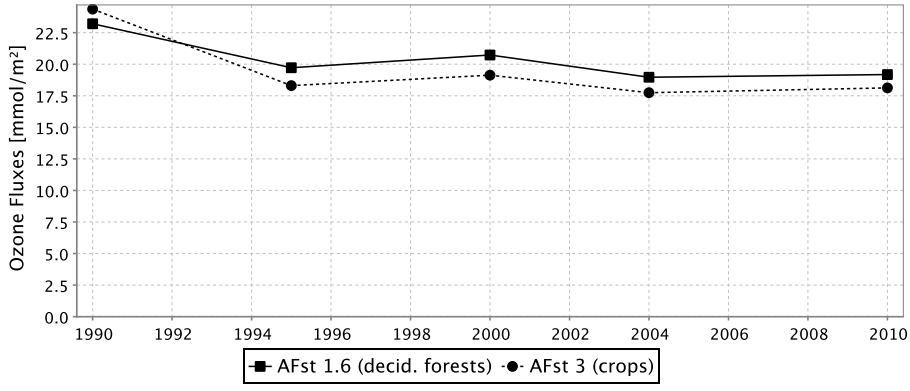




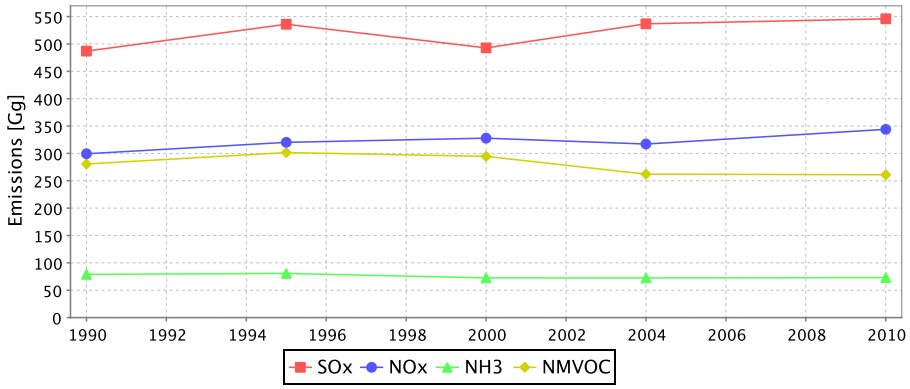

Acc. Exceedances [eq/ha/y]
3,000
2,750
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

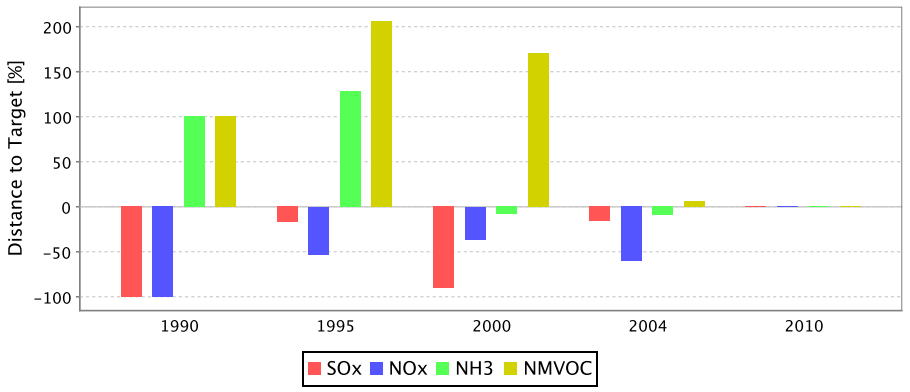

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

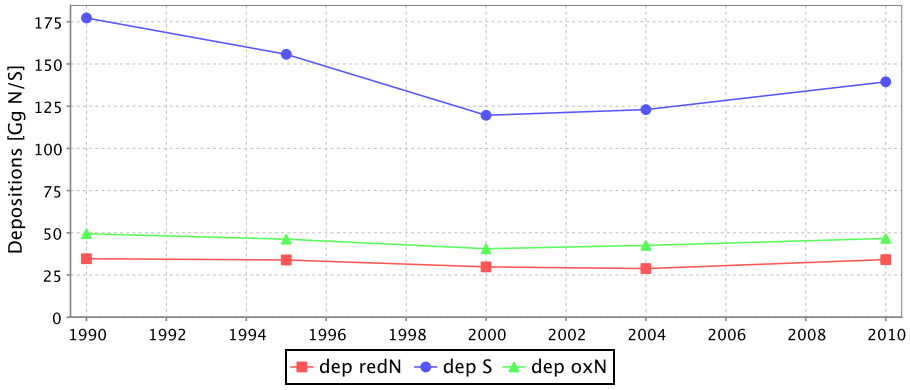

ppb.days
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

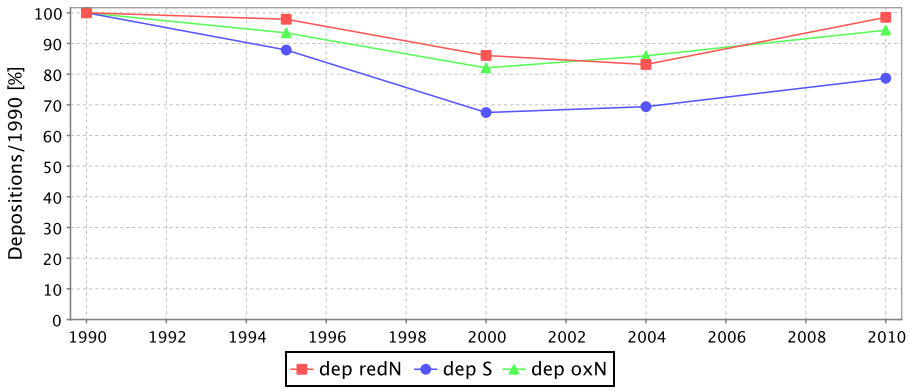

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

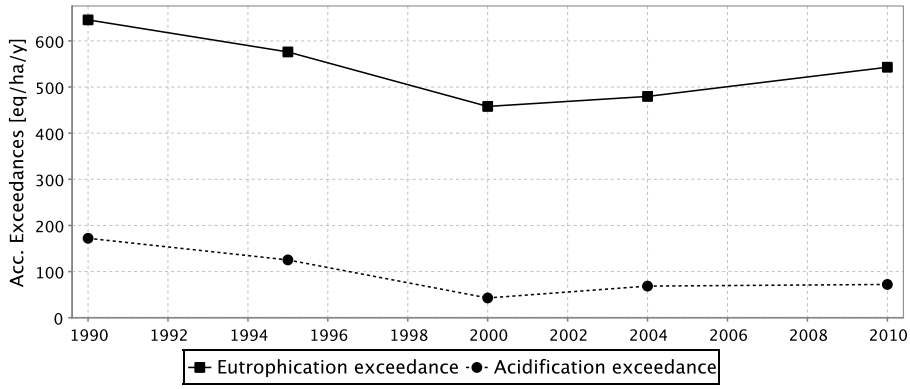
Greece (Signatory to the Gothenburg Protocol)

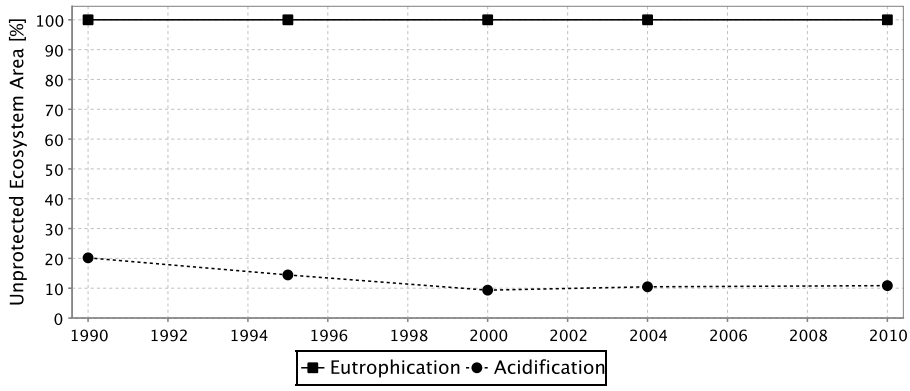


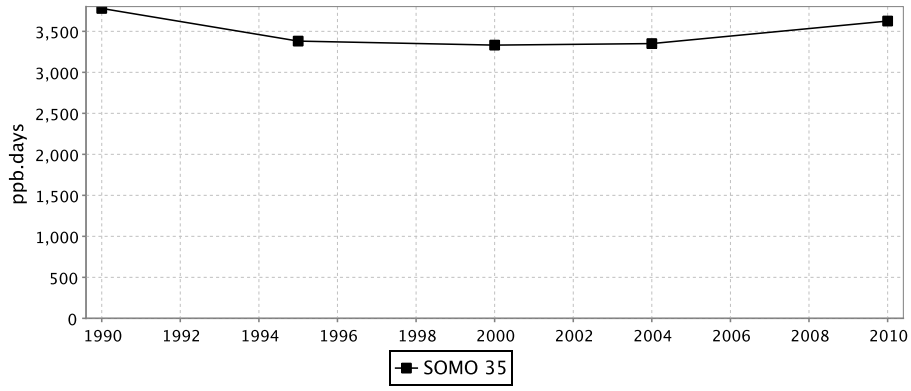


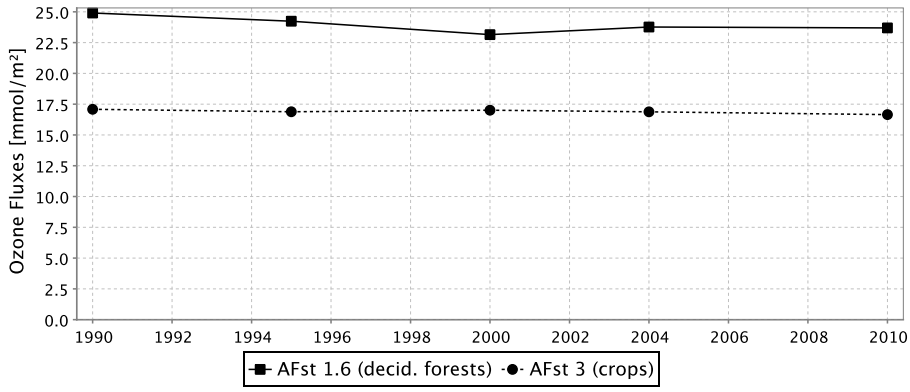




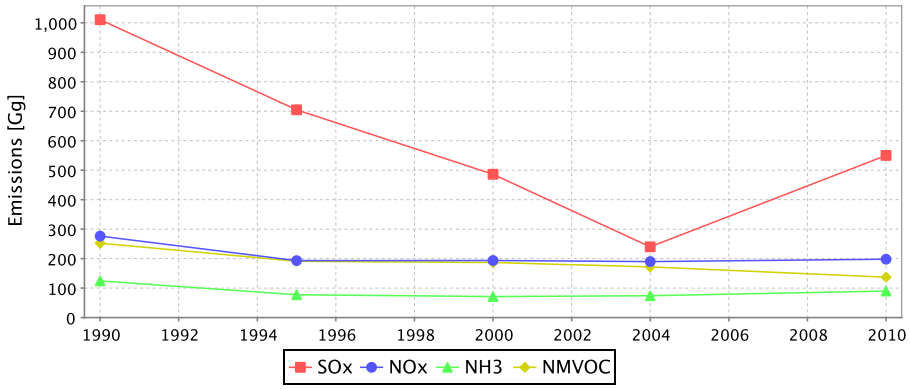

Acc. Exceedances [eq/ha/y]
0
100
200
300
400
500
600
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

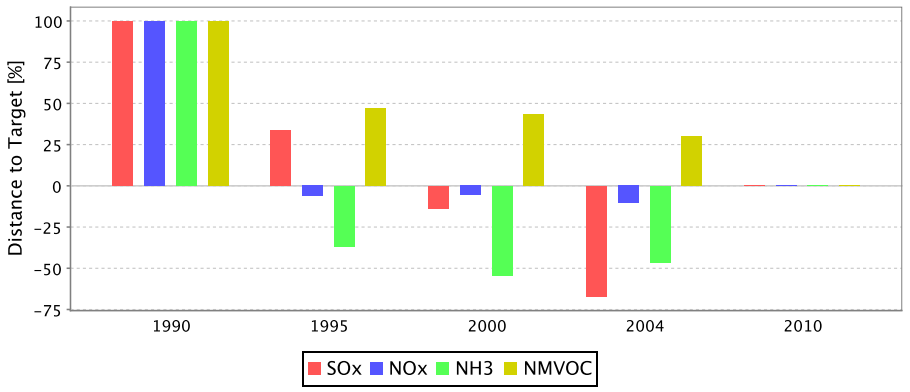

Unprotected Ecosystem Area [%]
0
10
20
30
40
50
60
70
80
90
100
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

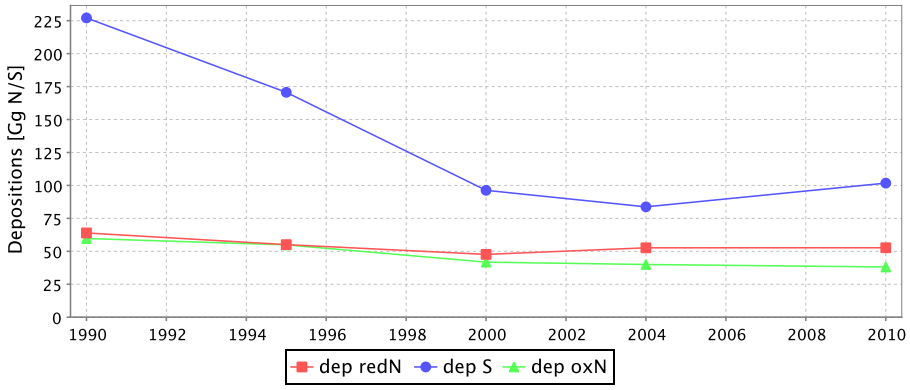

ppb.days
0
500
1,000
1,500
2,000
2,500
3,000
3,500
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

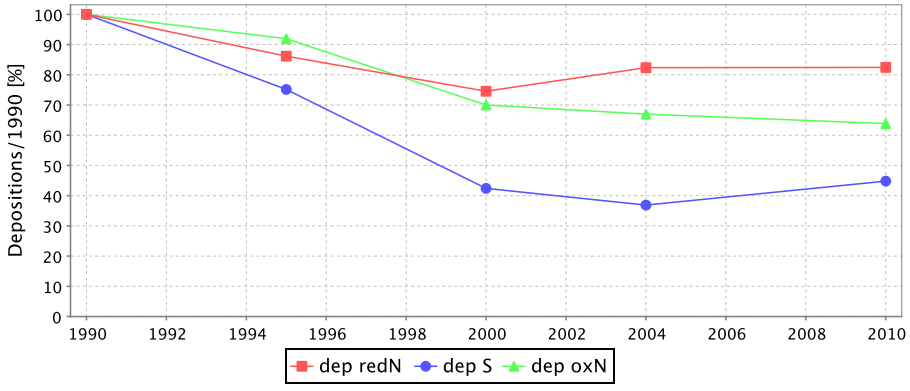

Ozone Fluxes [mmol/m²]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

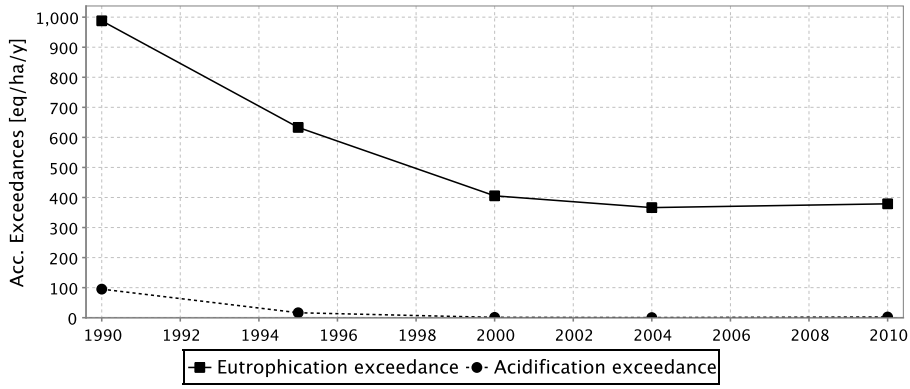
Hungary (Signatory to the Gothenburg Protocol)

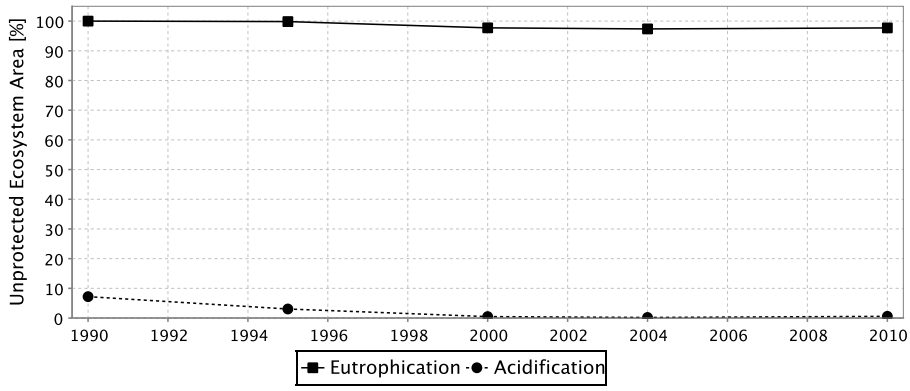


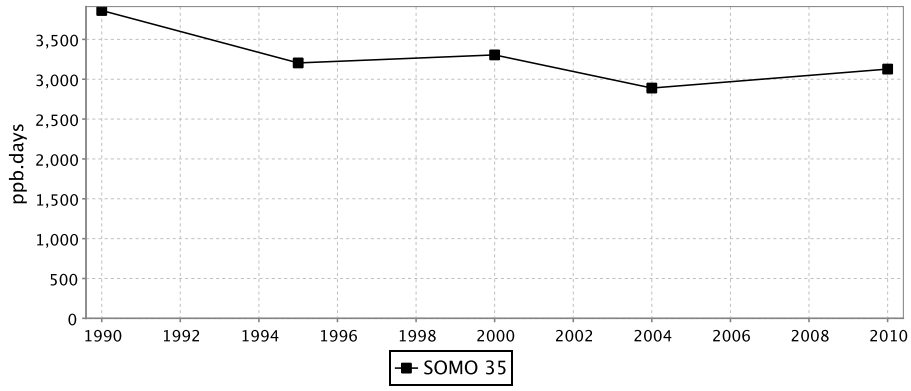


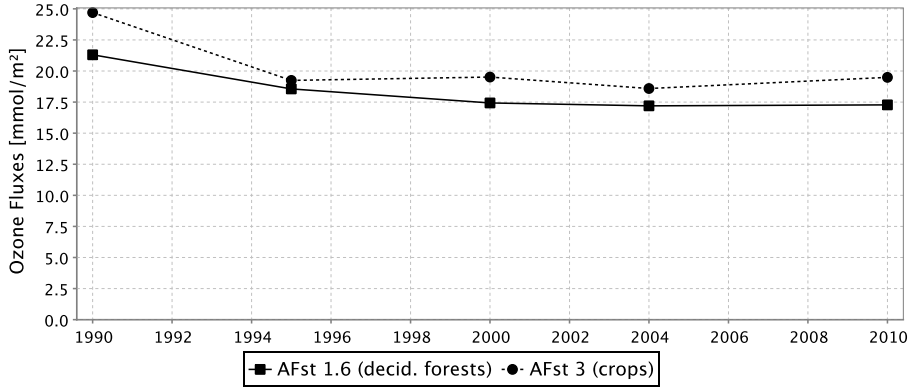




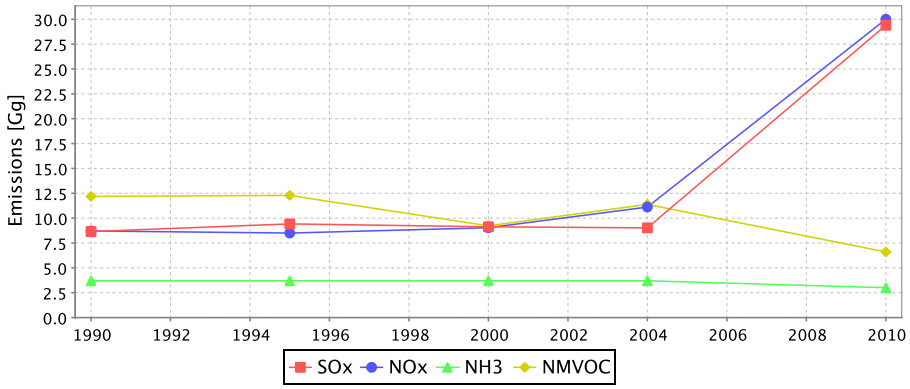

Acc. Exceedances [eq/ha/y]
1,000
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

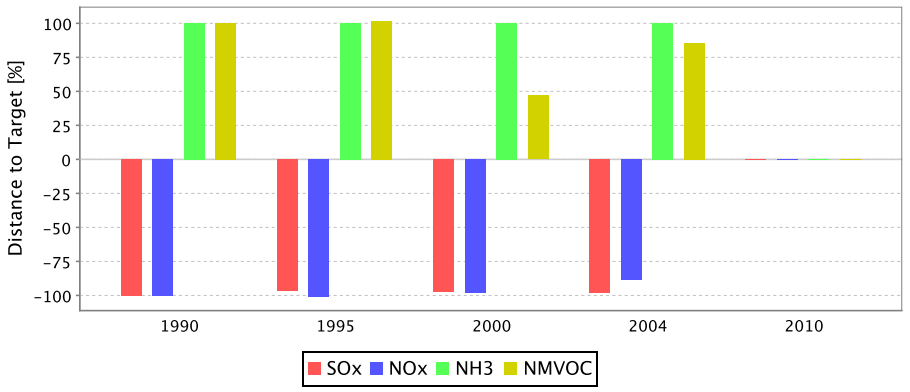

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

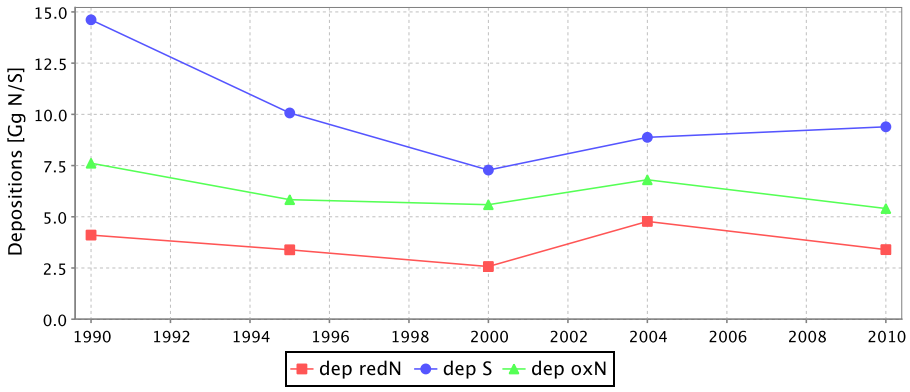

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

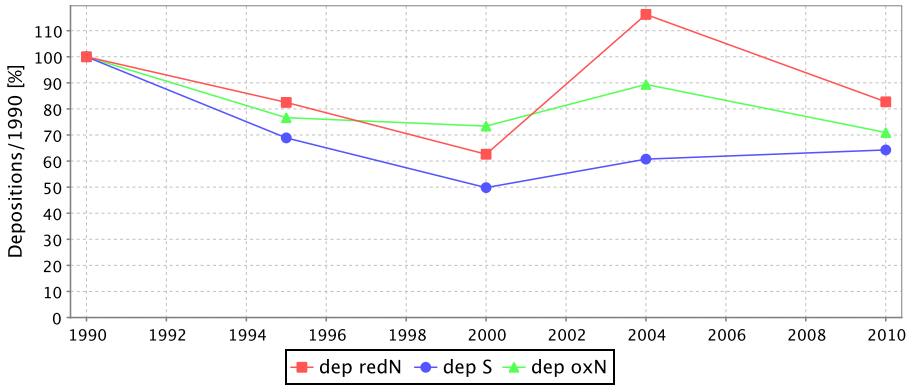

Ozone Fluxes [mmol/m²]
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

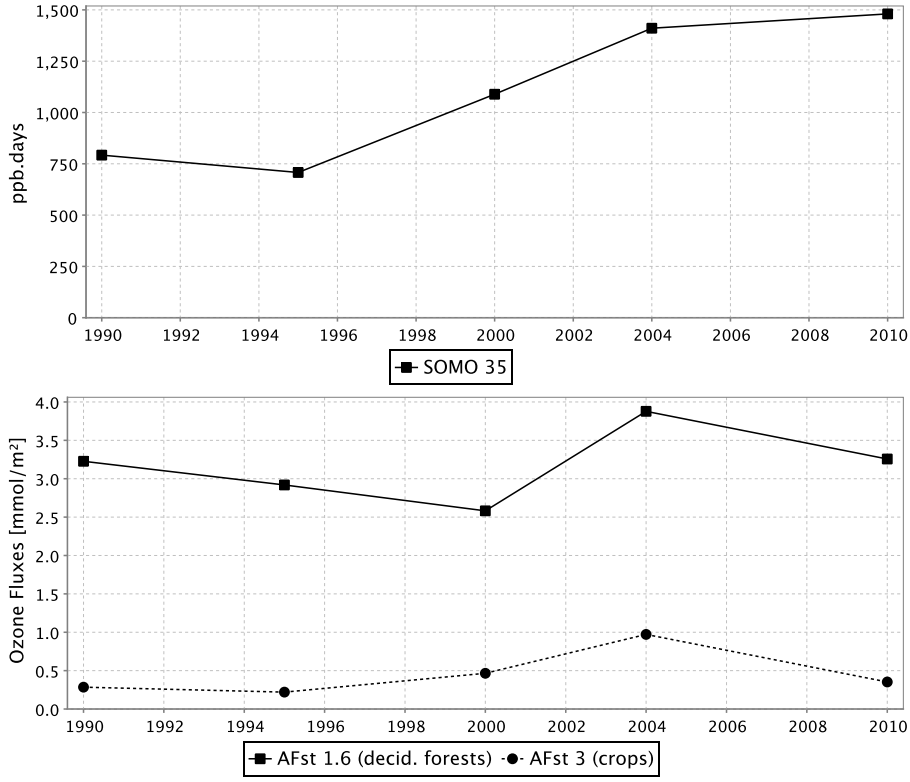
Iceland (Not included in the Gothenburg Protocol)



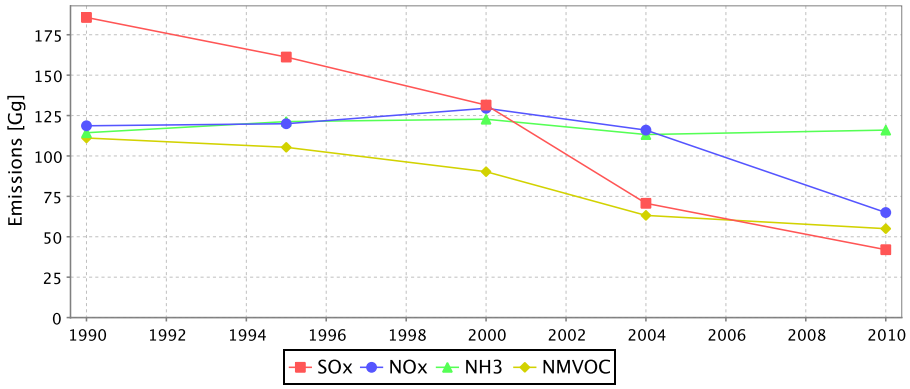


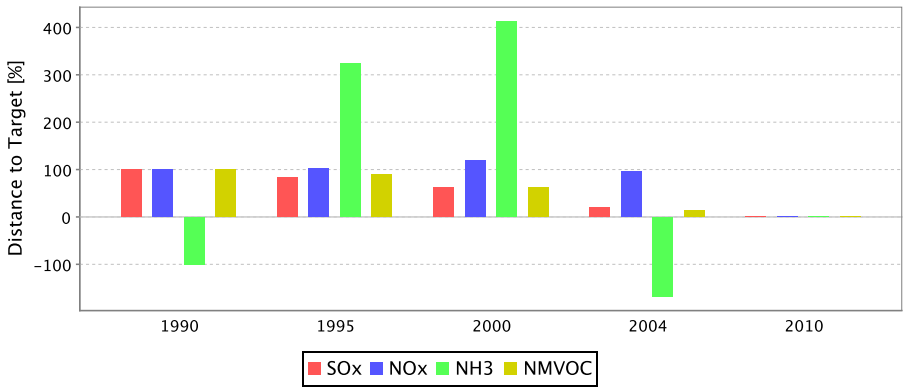


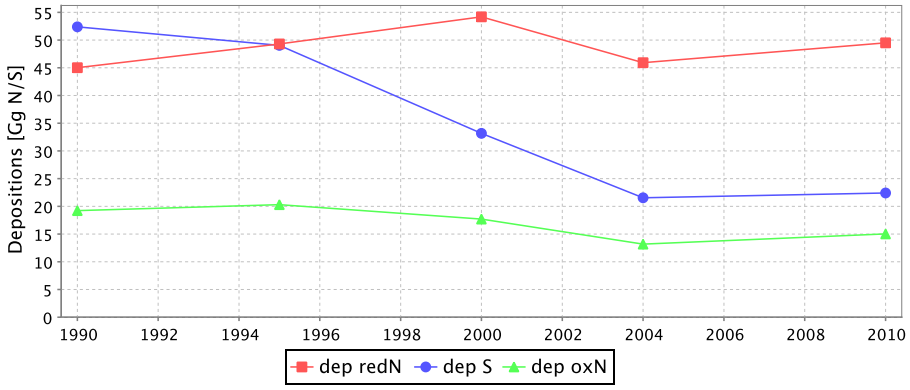


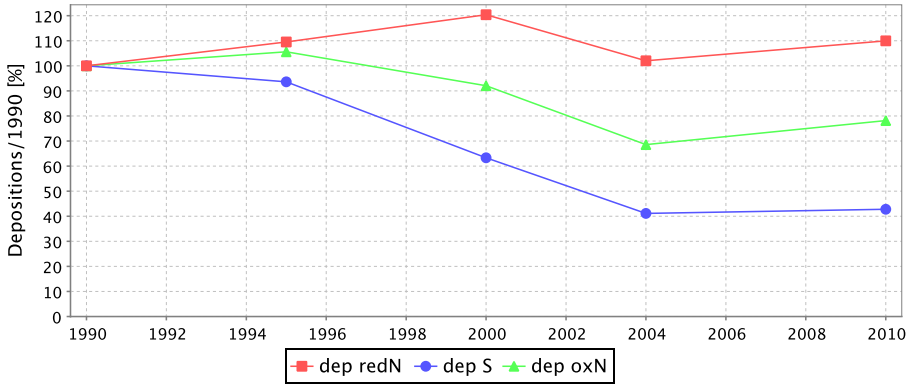

ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

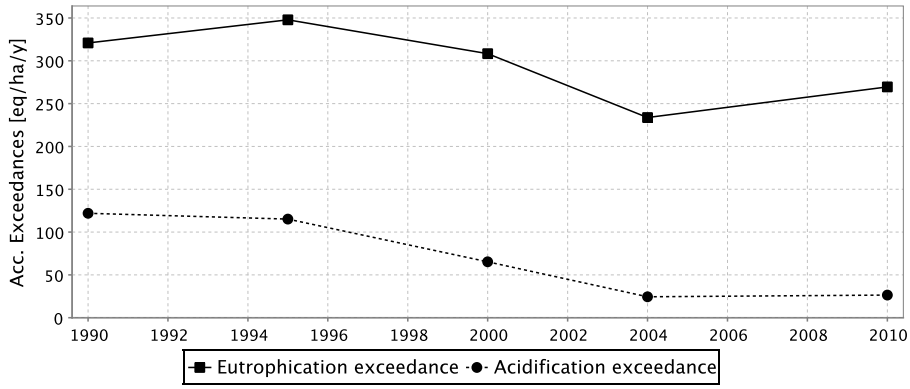
Ireland (Signatory to the Gothenburg Protocol)

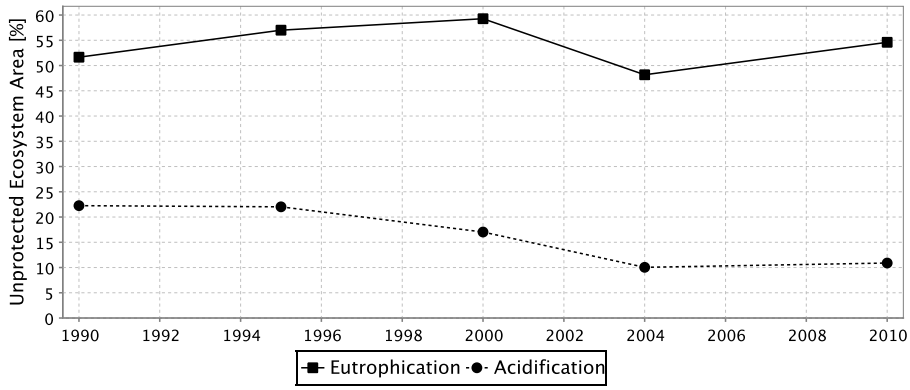


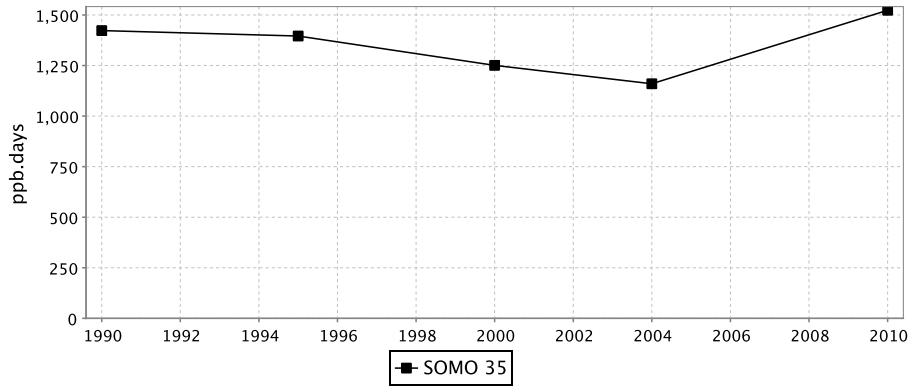


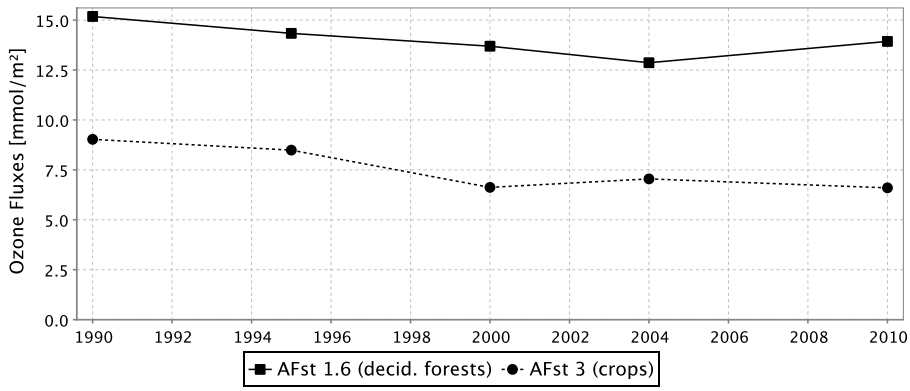




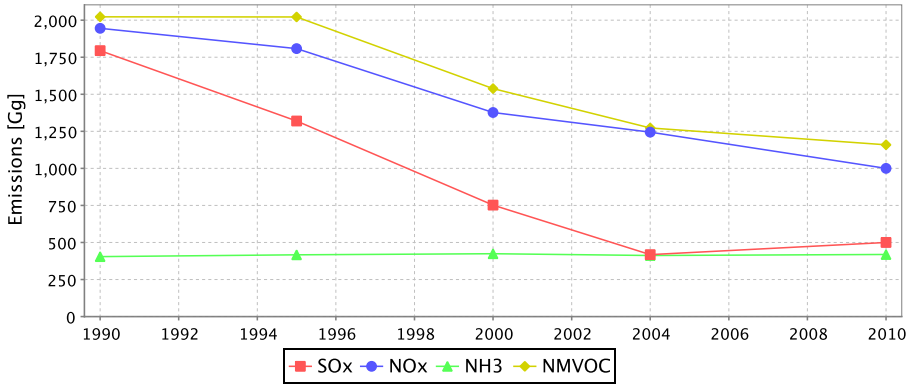

Acc. Exceedances [eq/ha/y]
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

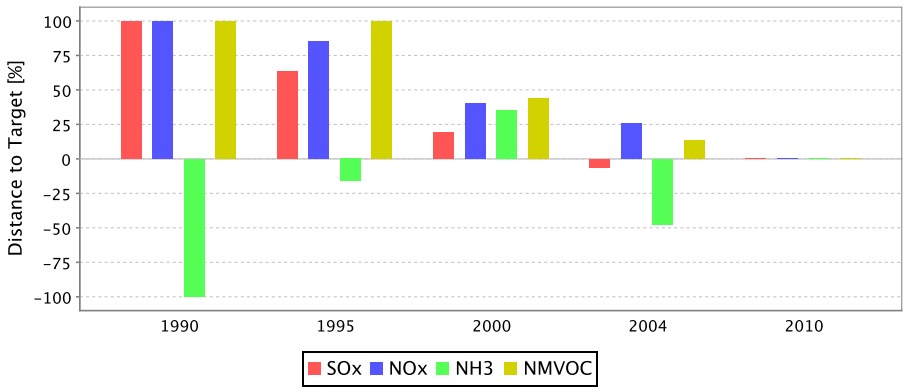

Unprotected Ecosystem Area [%]
60
55
50
45
40
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

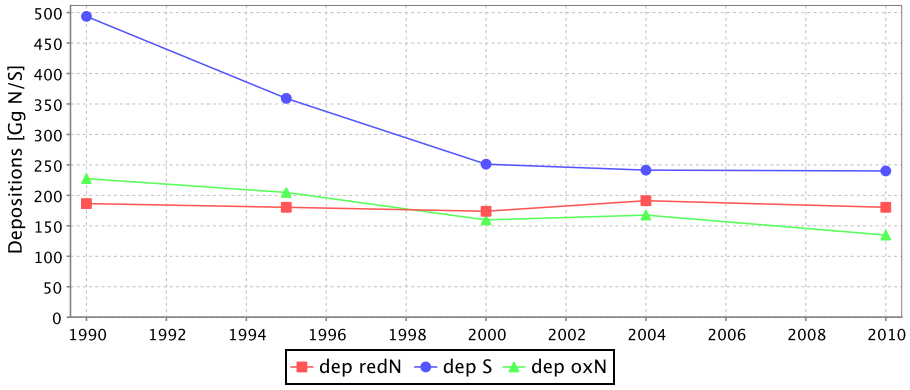

ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

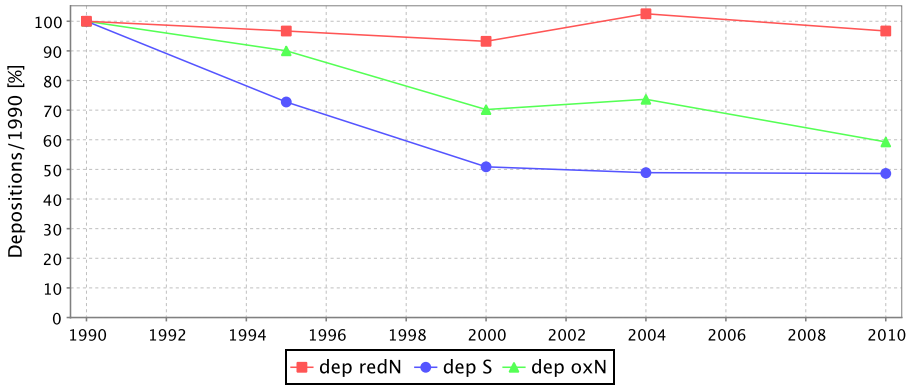

Ozone Fluxes [mmol/m²]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

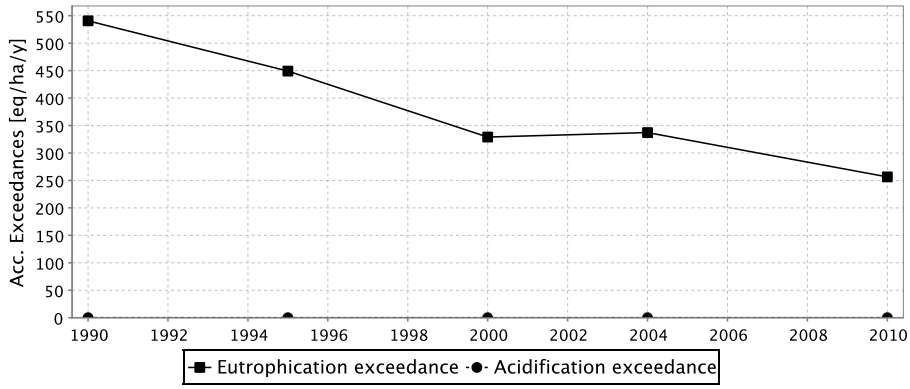
Italy (Signatory to the Gothenburg Protocol)

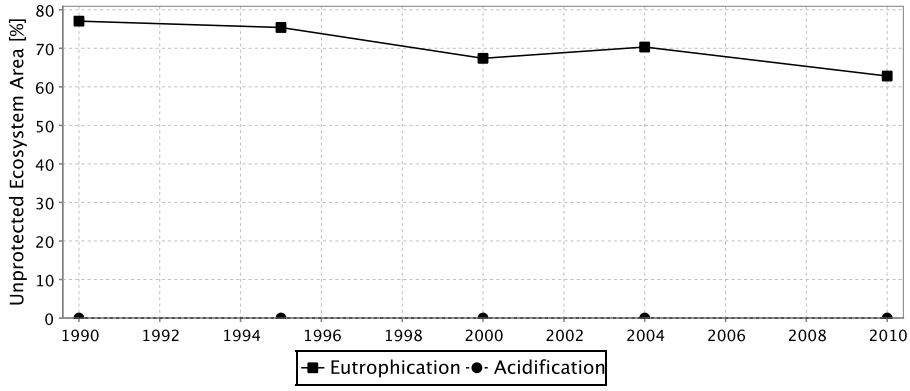


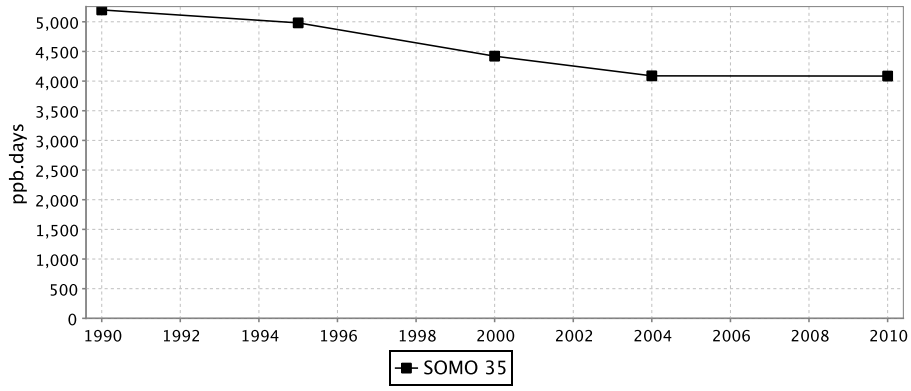


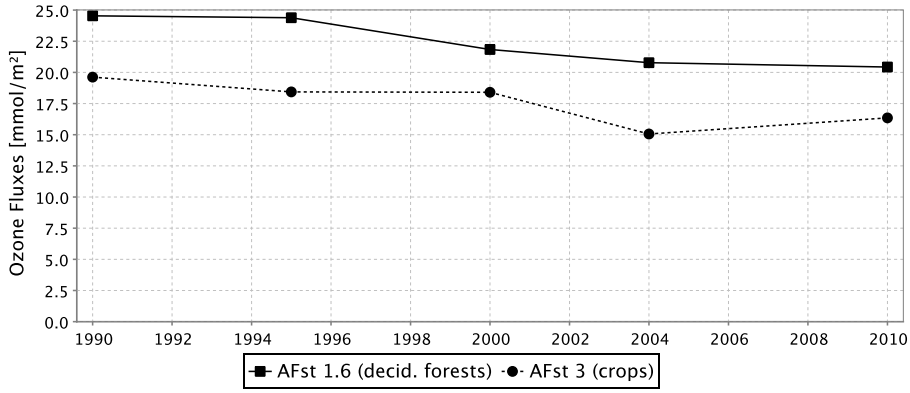




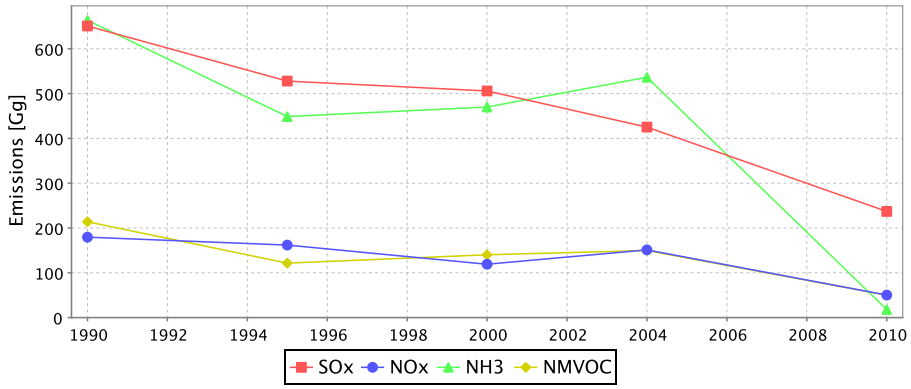

Acc. Exceedances [eq/ha/y]
550
500
450
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

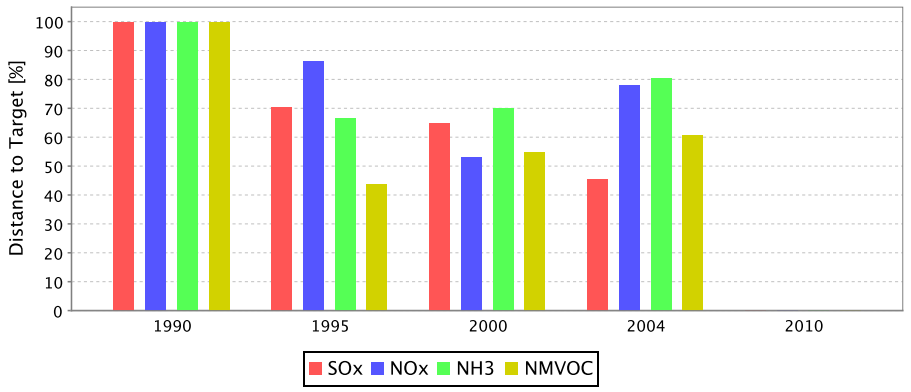

Unprotected Ecosystem Area [%]
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

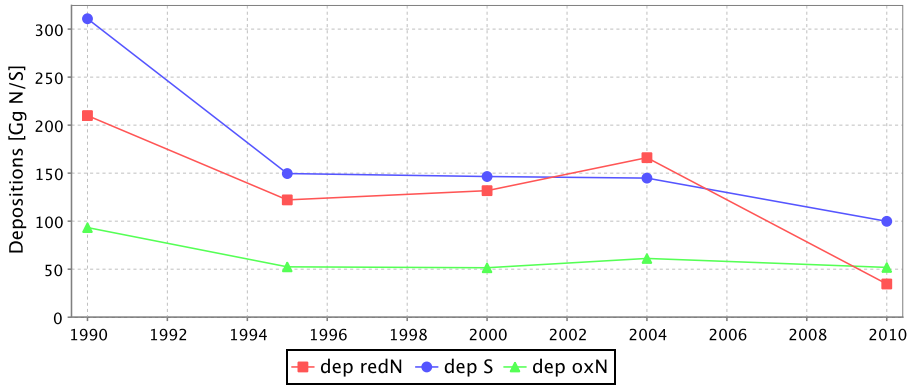

ppb.days
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

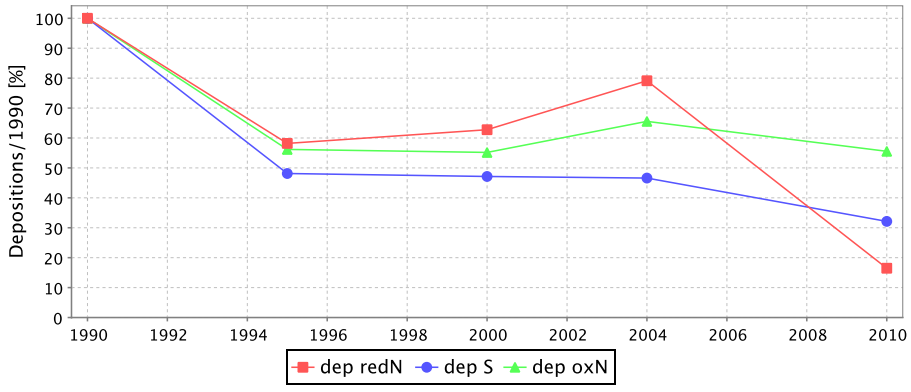

Ozone Fluxes [mmol/m²]
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

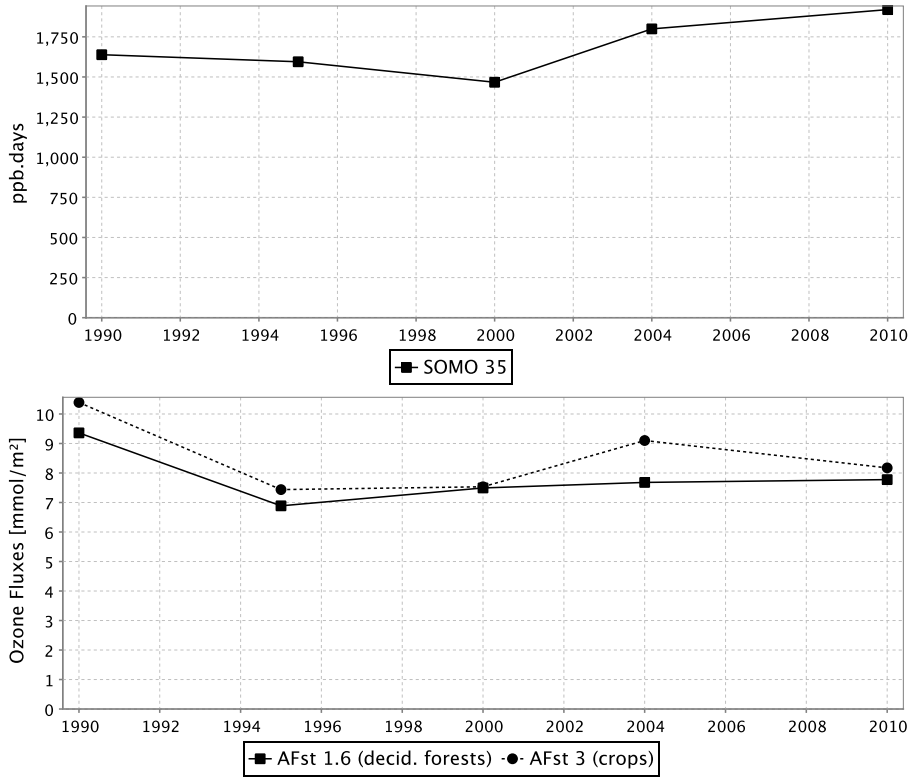
Kazakhstan (Not included in the Gothenburg Protocol)



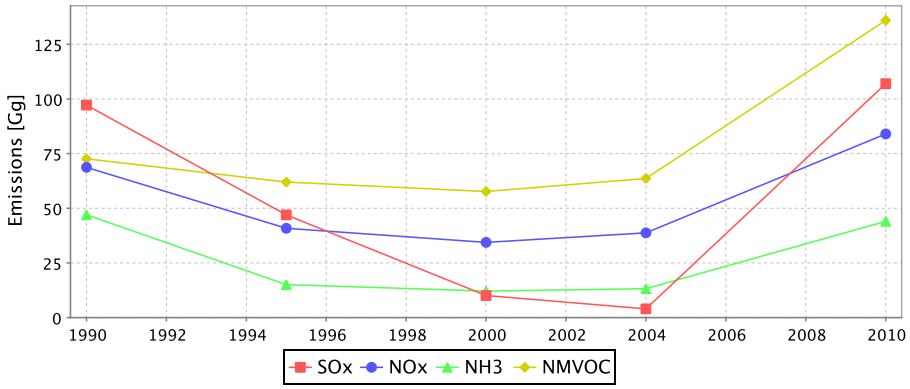


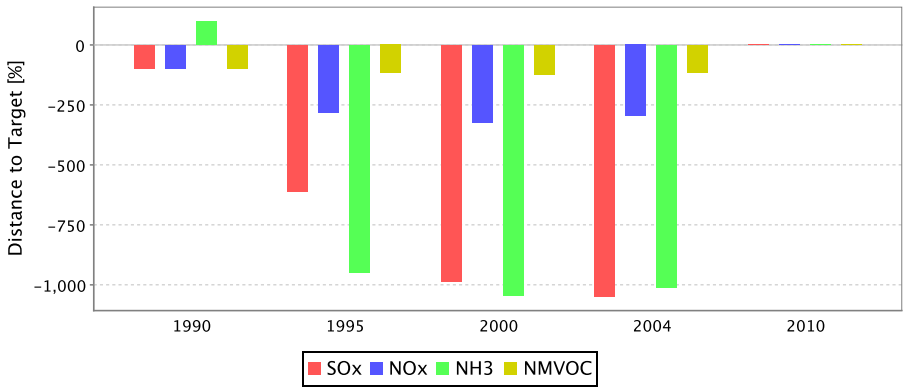


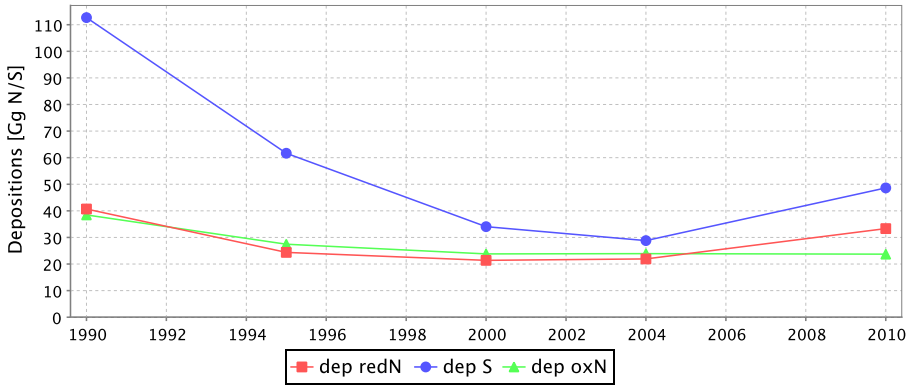


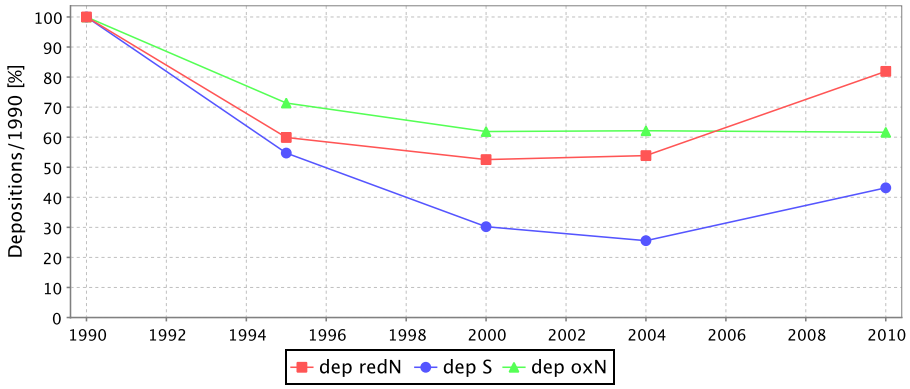

ppb.days
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
10
9
8
7
6
5
4
3
2
1
0
AFst 1.6 (decid. forests)
AFst 3 (crops)

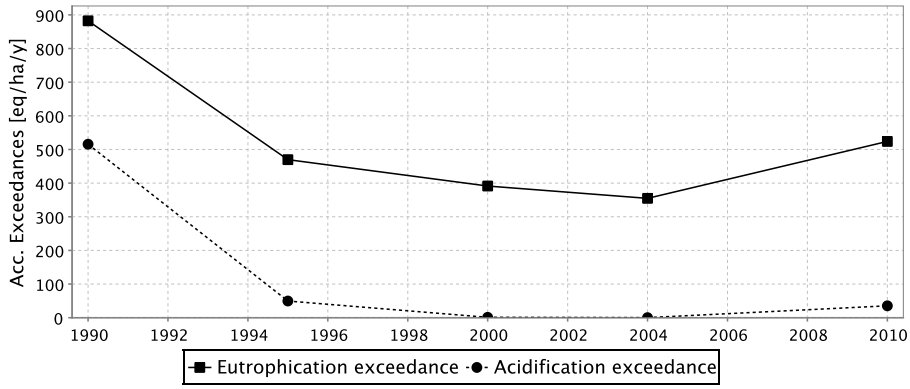
Latvia (Party to the Gothenburg Protocol)

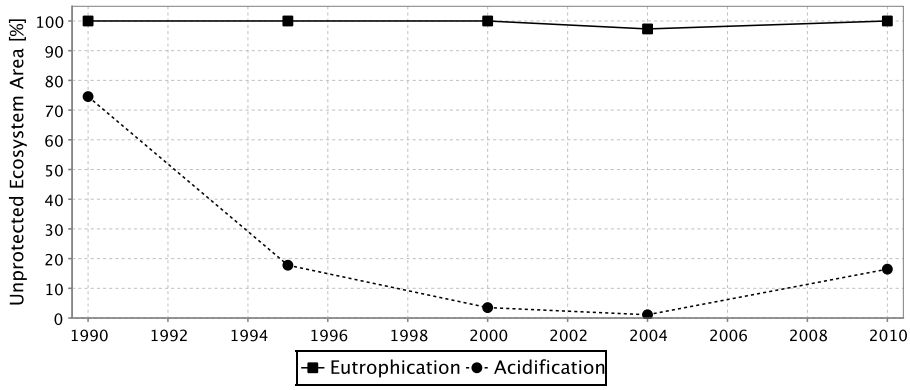


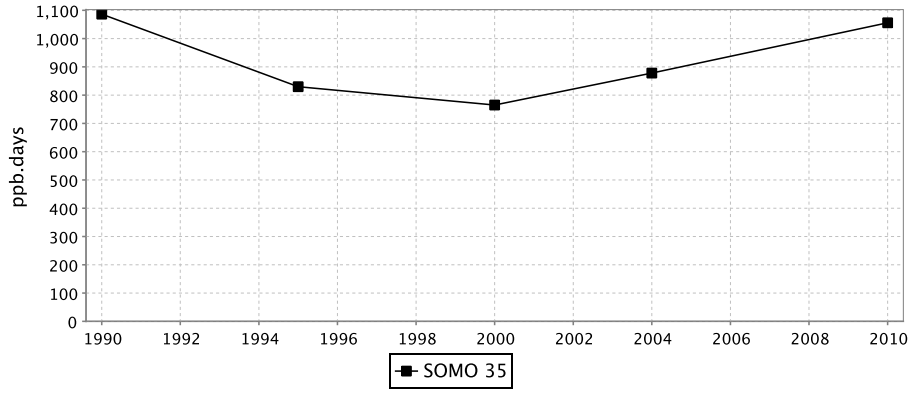


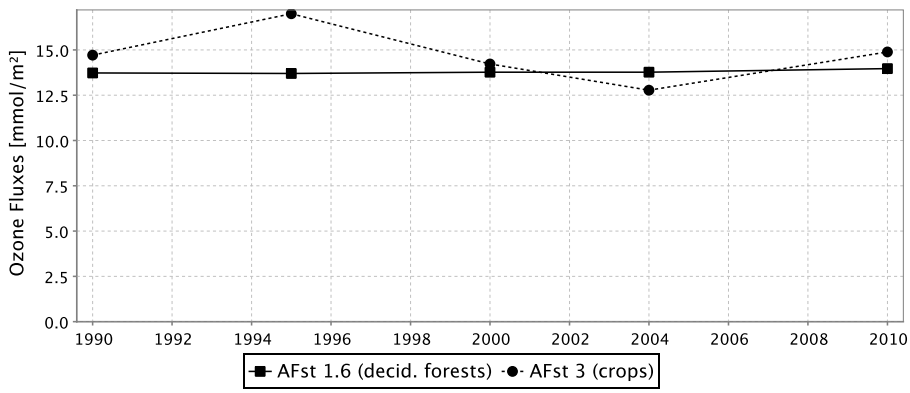




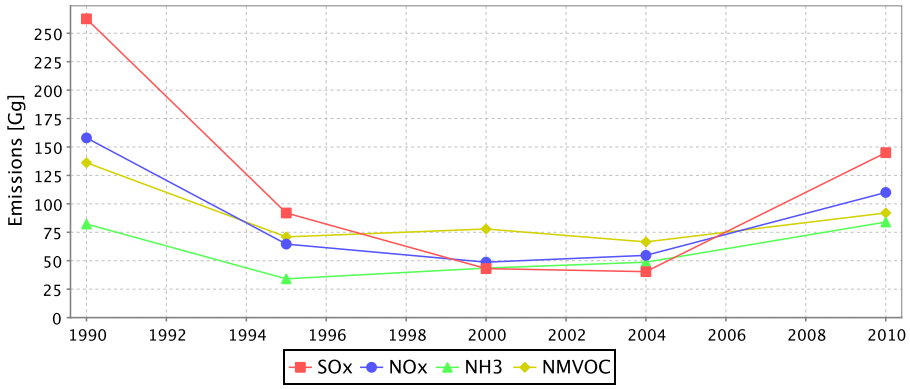

Acc. Exceedances [eq/ha/y]
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

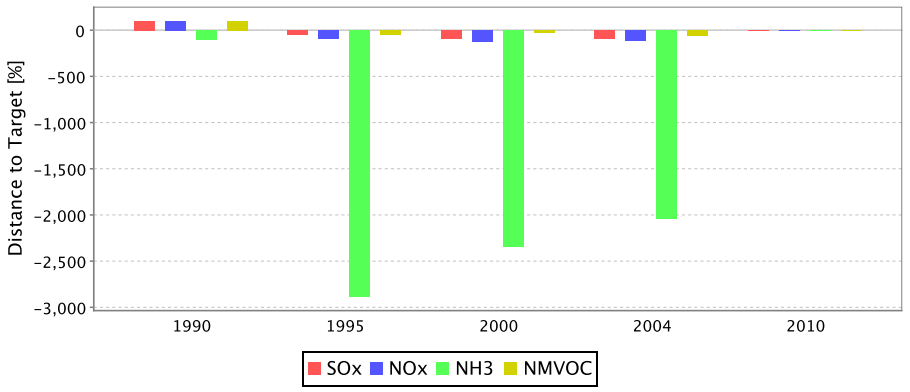

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

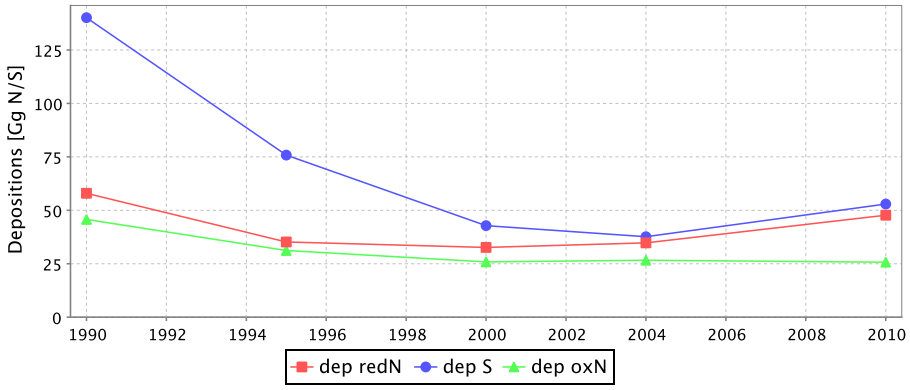

ppb.days
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

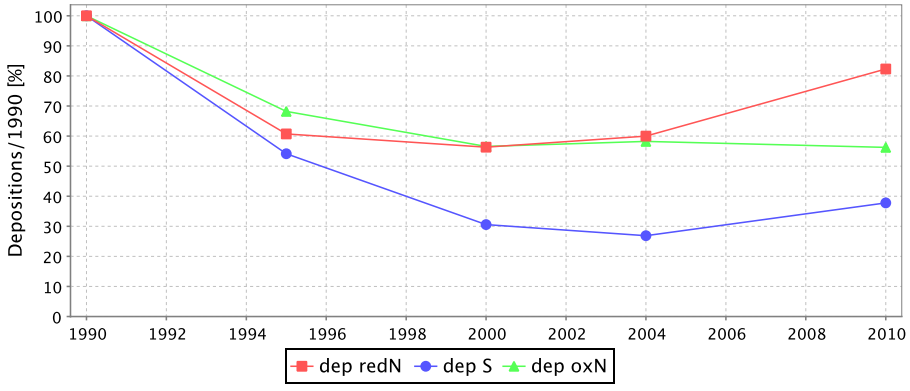

Ozone Fluxes [mmol/m²]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

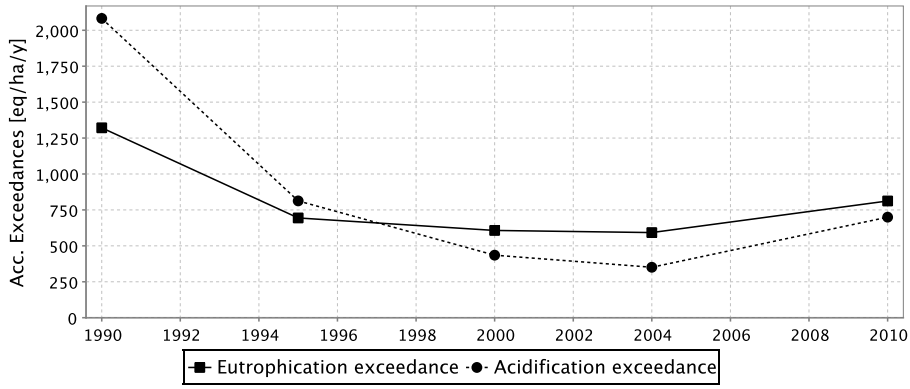
Lithuania (Party to the Gothenburg Protocol)

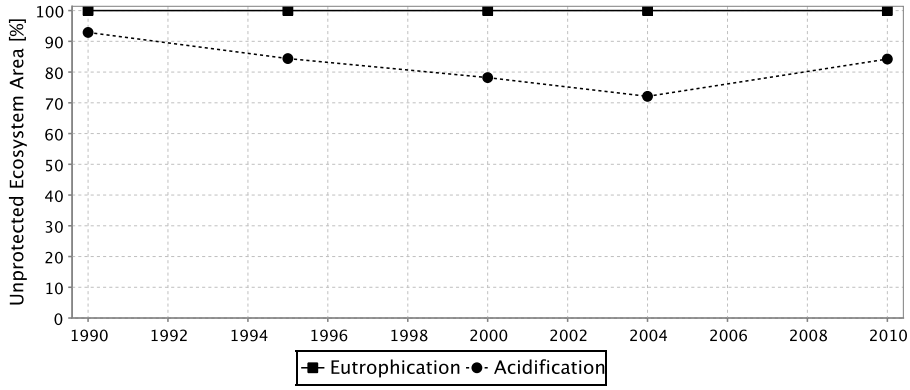


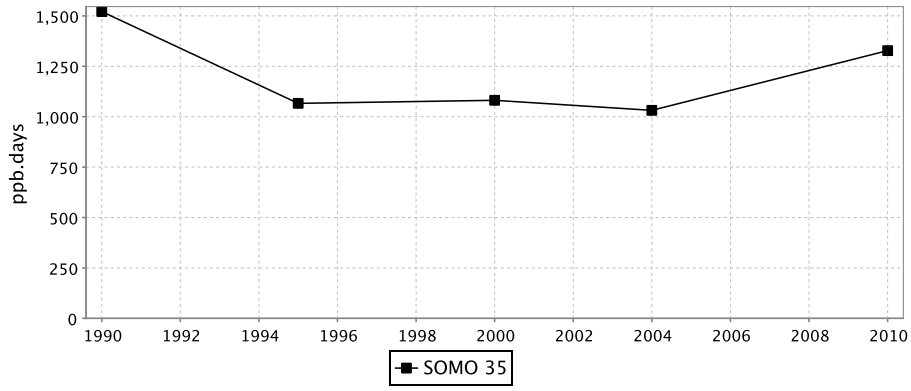


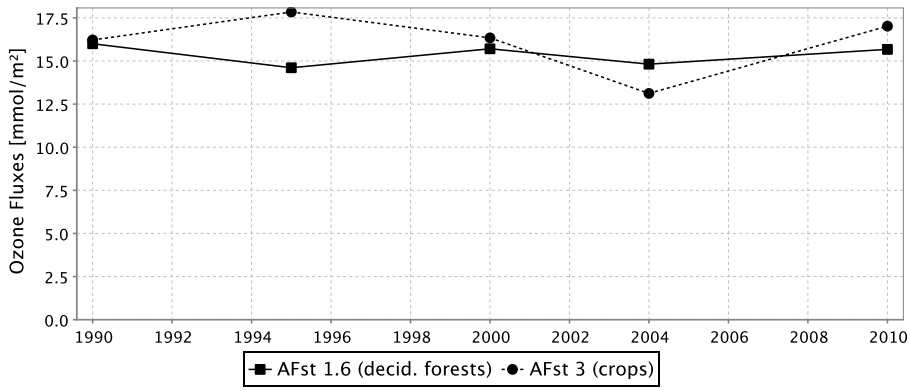




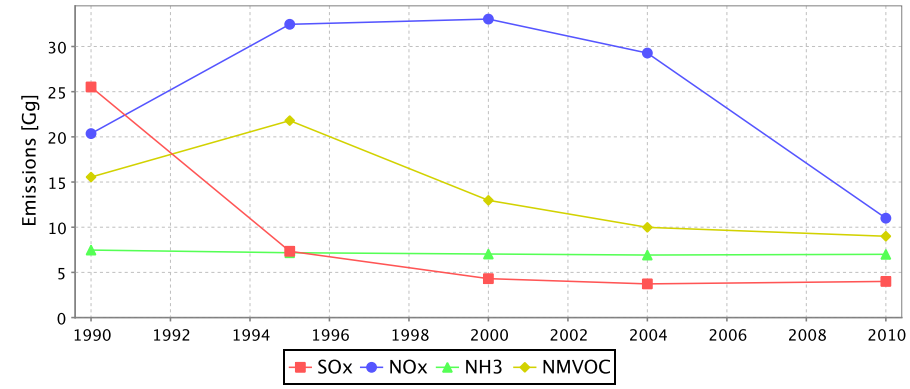

Acc. Exceedances [eq/ha/y]
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

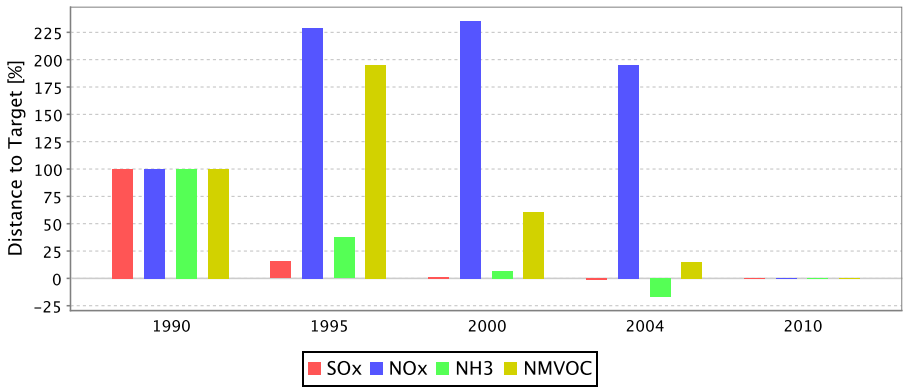

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

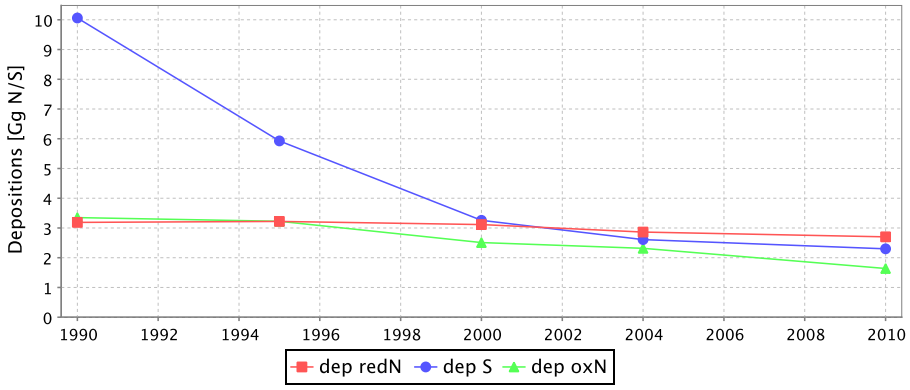

ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

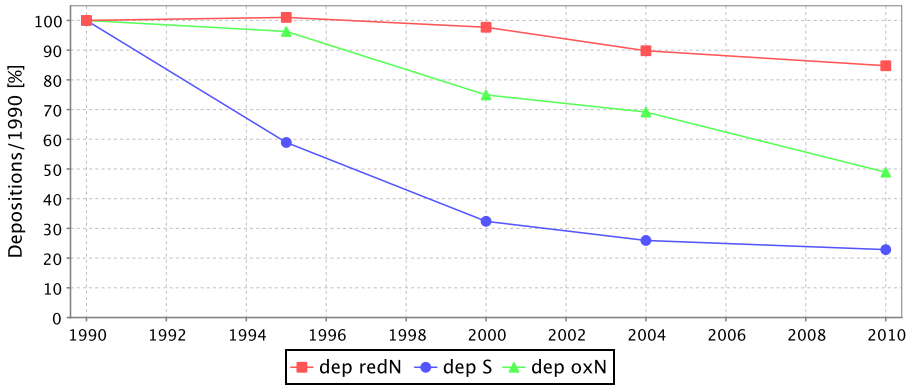

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

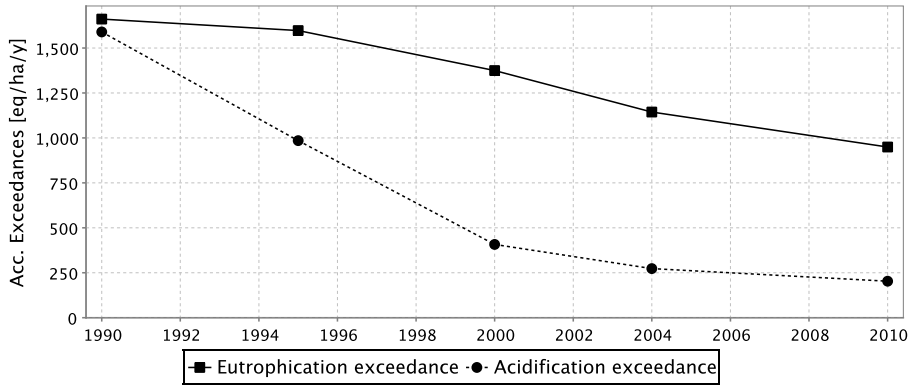
Luxembourg (Party to the Gothenburg Protocol)

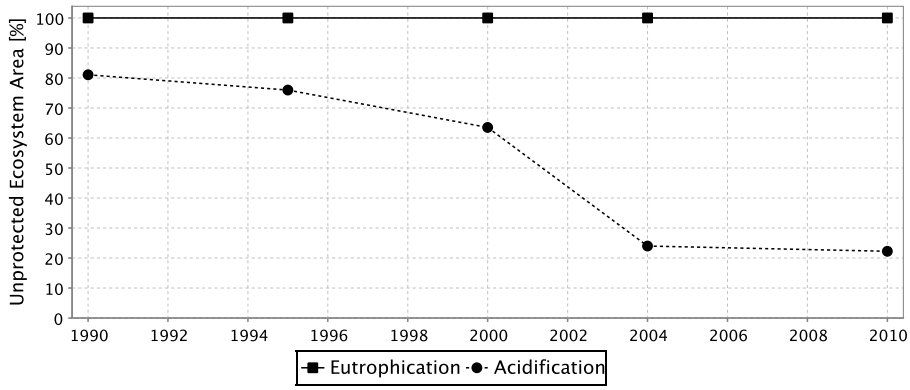


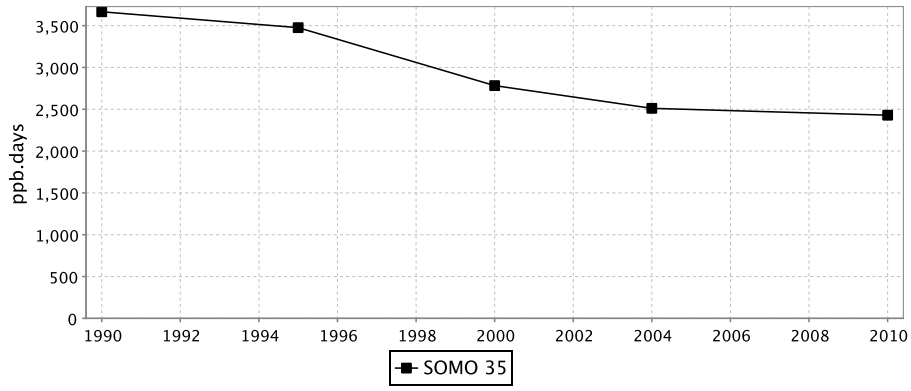


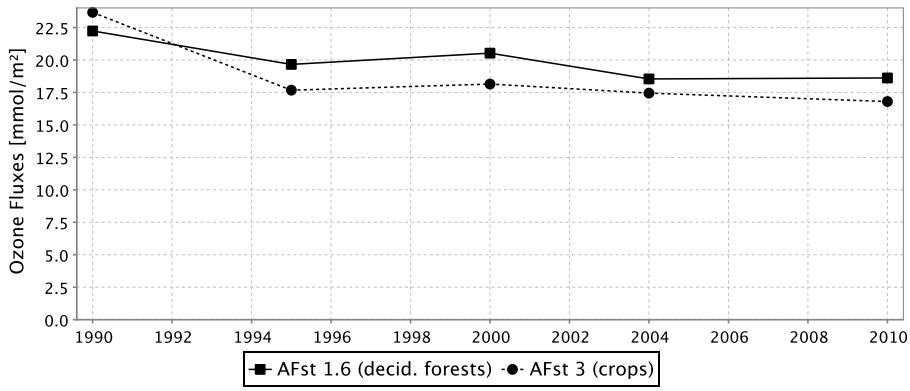




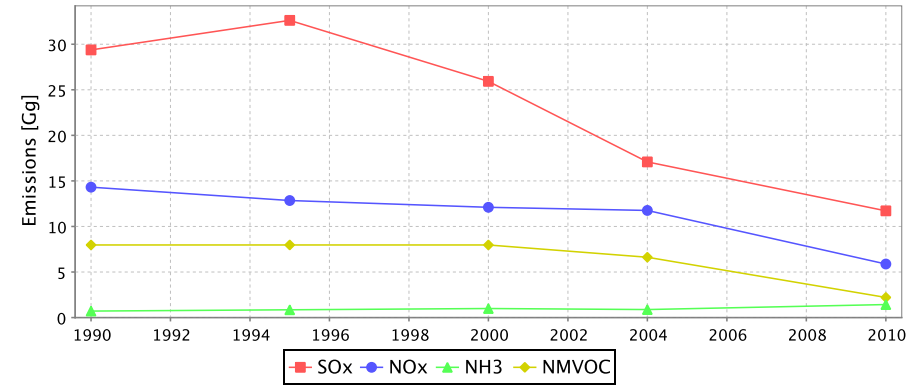

Acc. Exceedances [eq/ha/y]
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

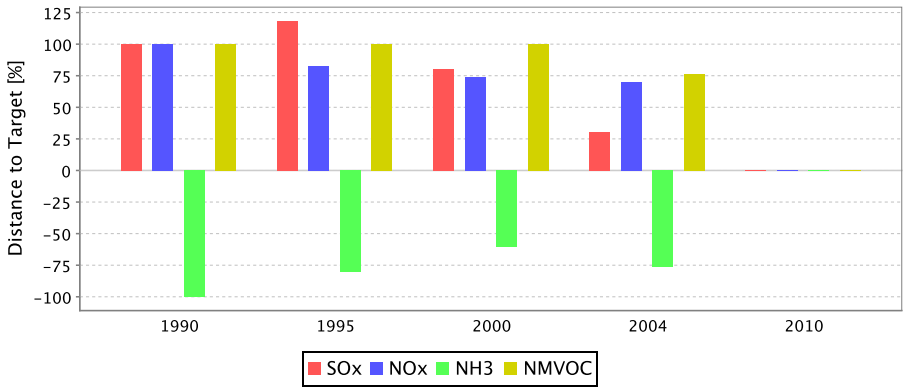

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

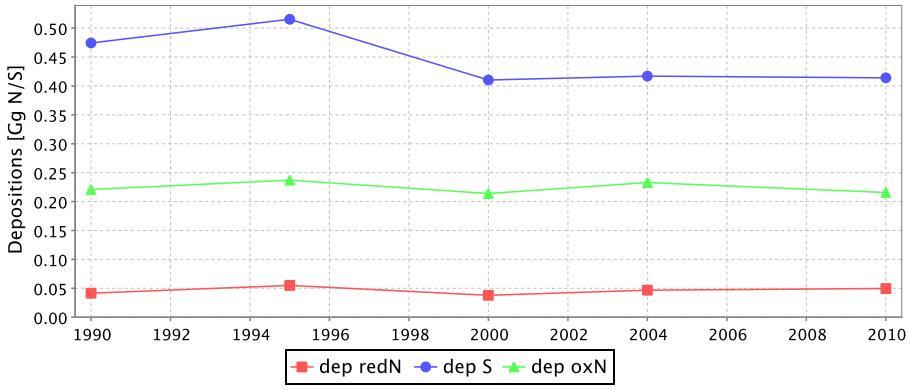

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

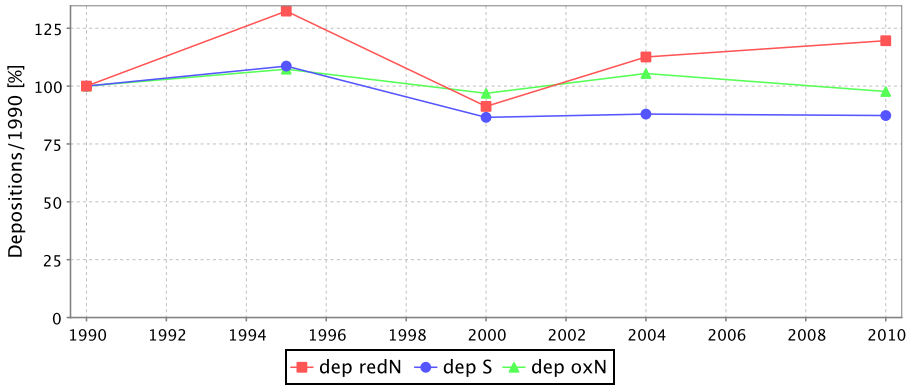

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

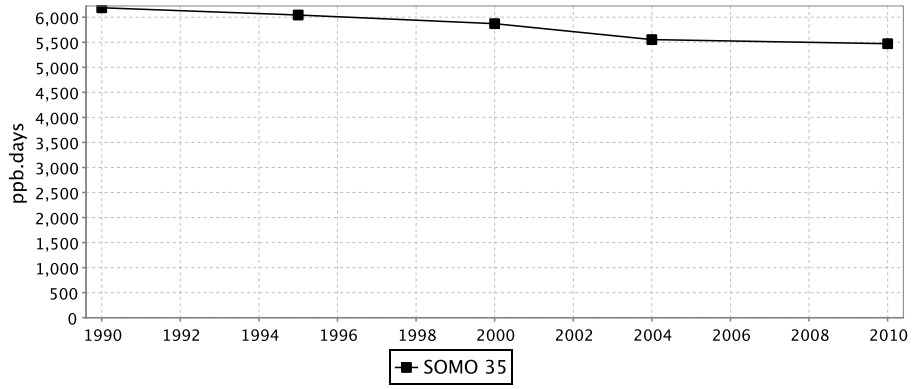
Malta (Not included in the Gothenburg Protocol)



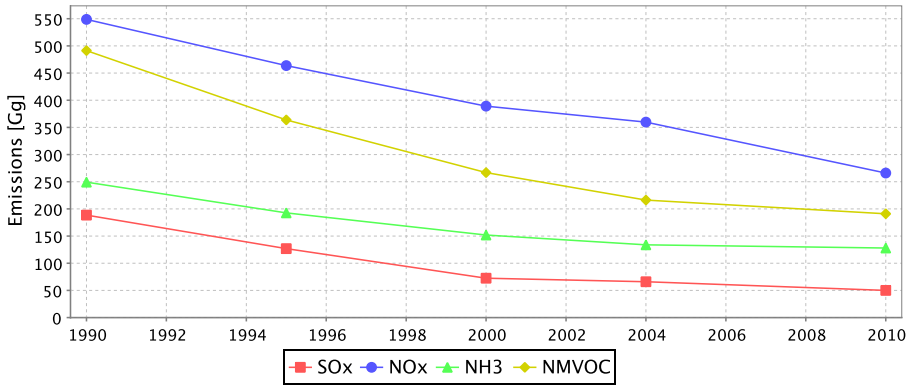


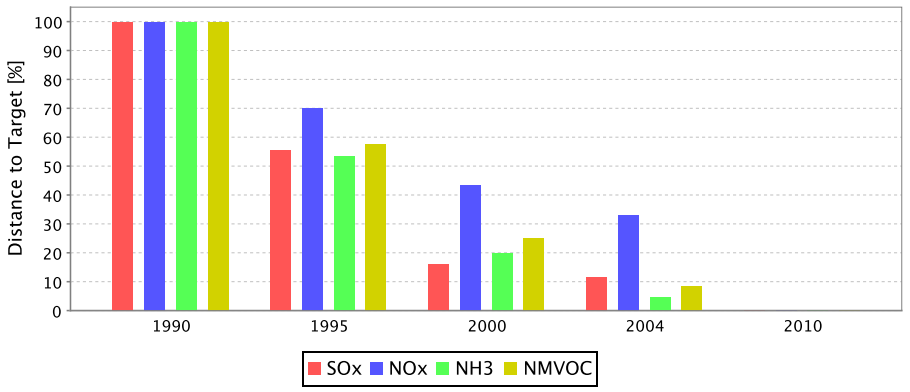


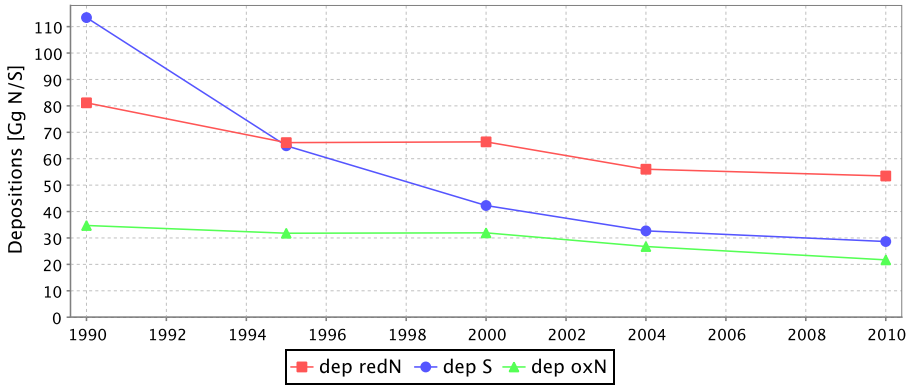


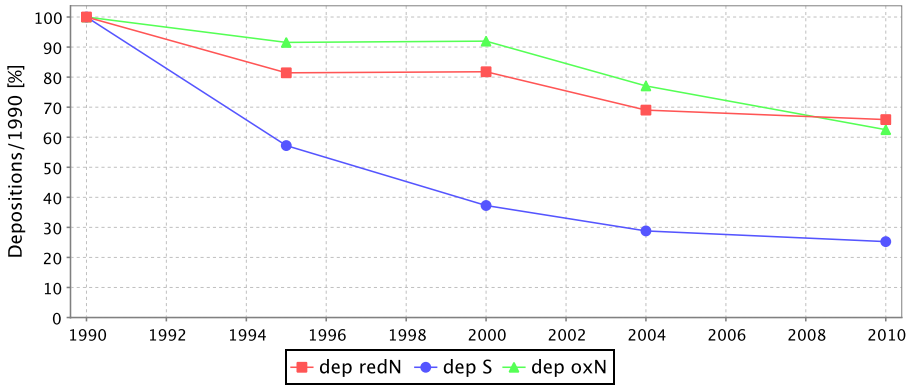

ppb.days
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

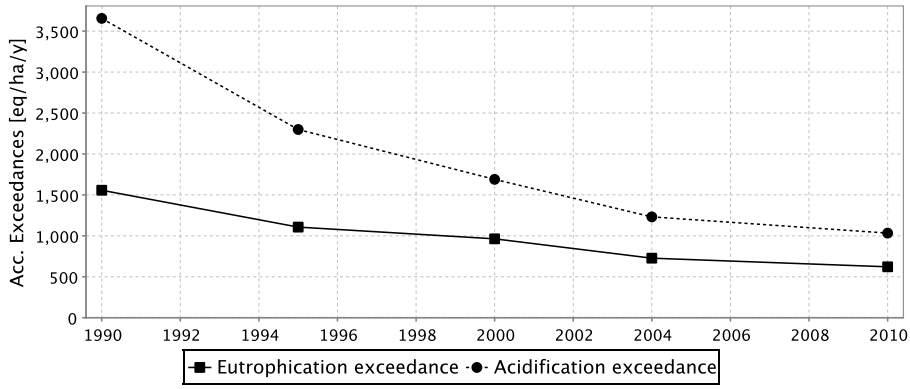
The Netherlands (Party to the Gothenburg Protocol)

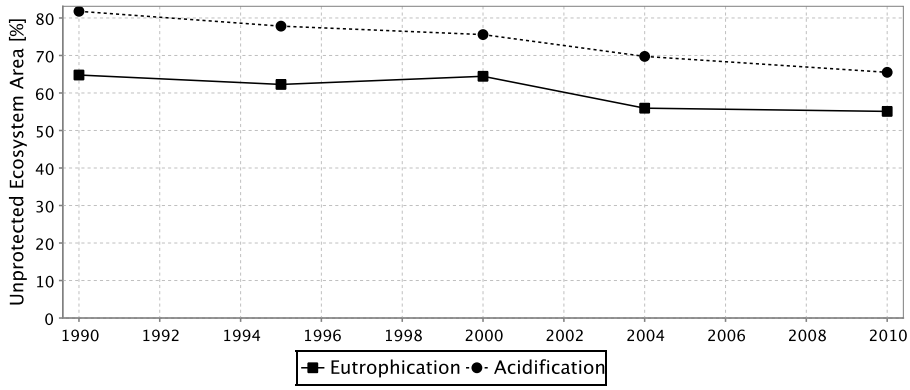


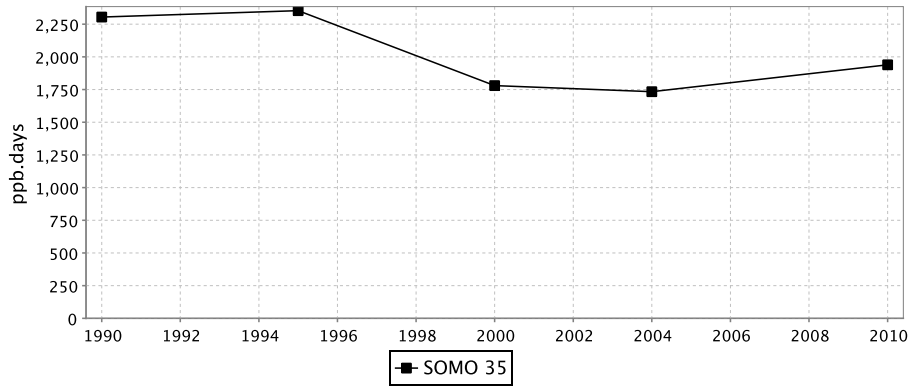


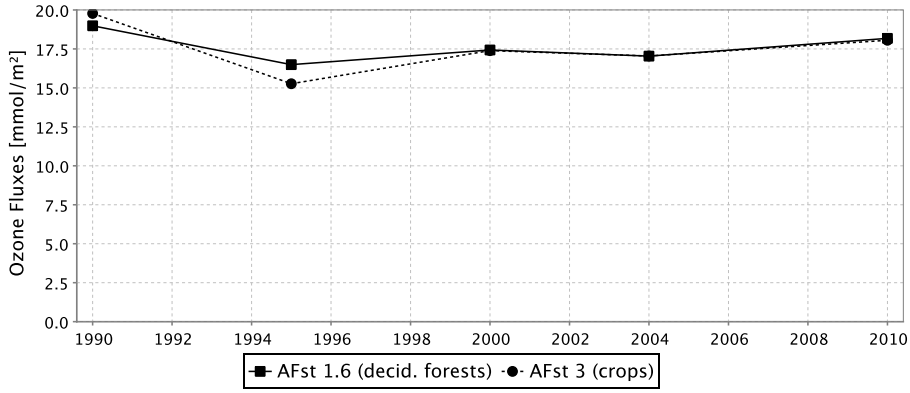




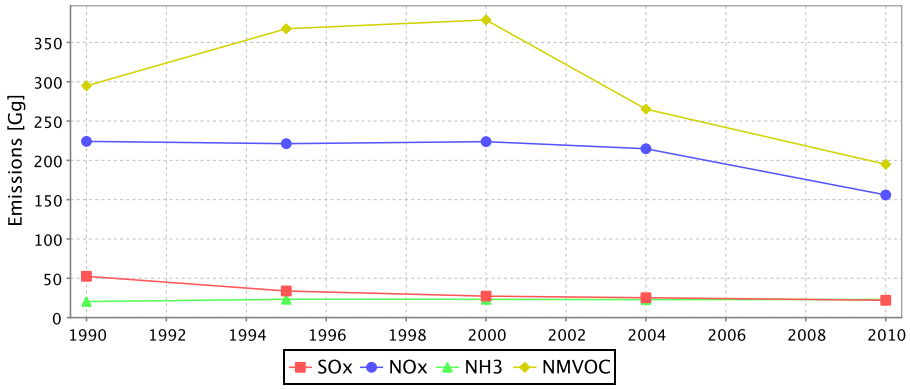

Acc. Exceedances [eq/ha/y]
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication exceedance
Acidification exceedance

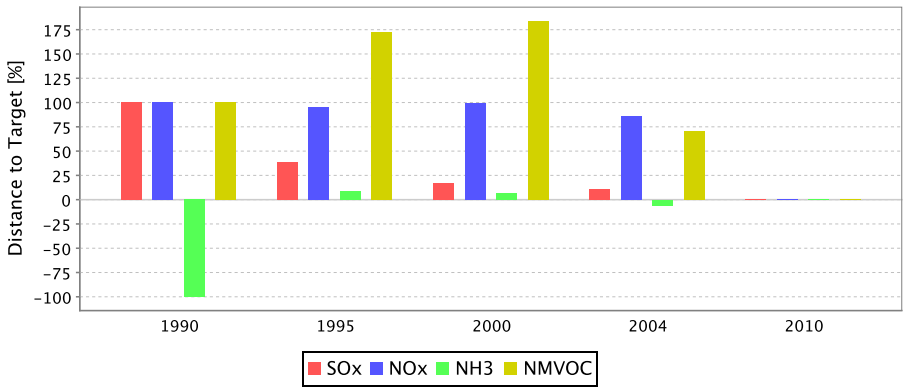

Unprotected Ecosystem Area [%]
80
70
60
50
40
30
20
10
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication
Acidification

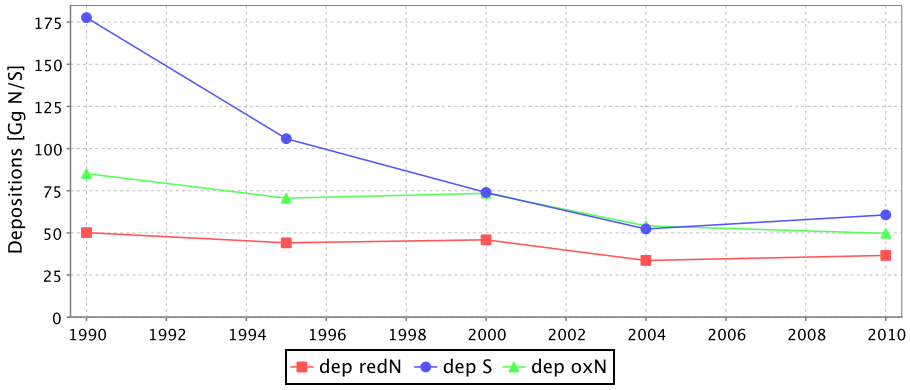

ppb.days
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
SOMO 35

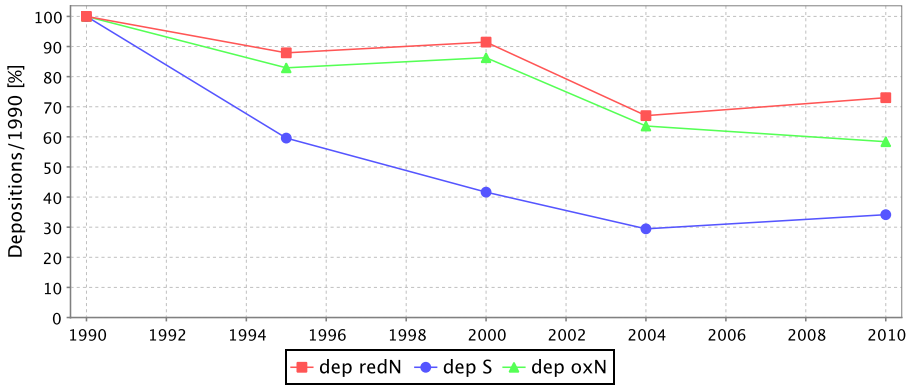

Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

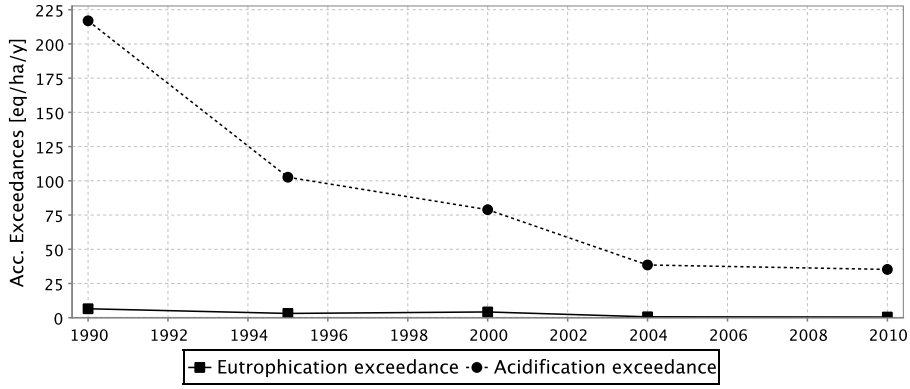
Norway (Party to the Gothenburg Protocol)

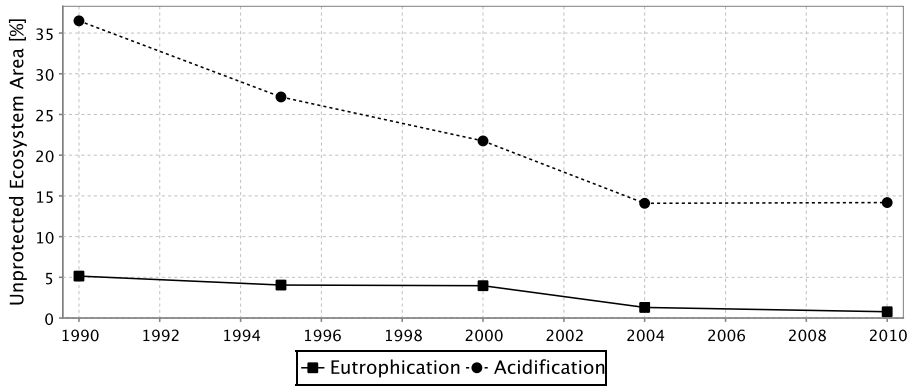


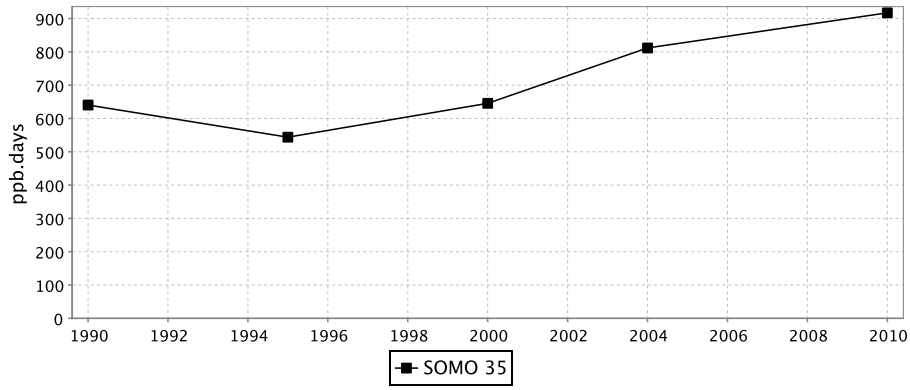


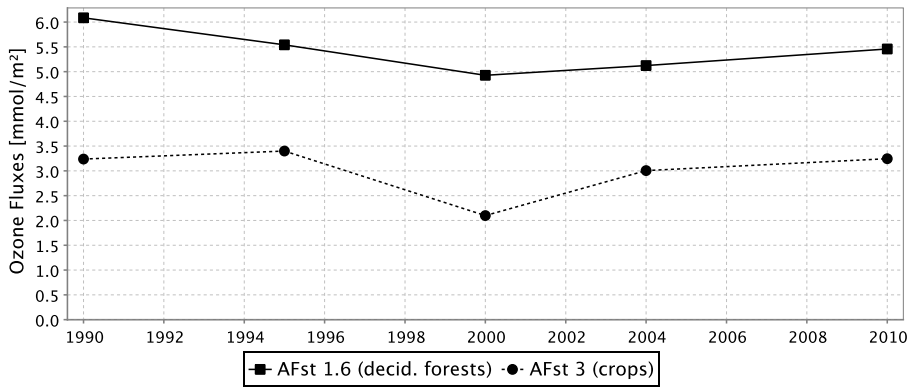




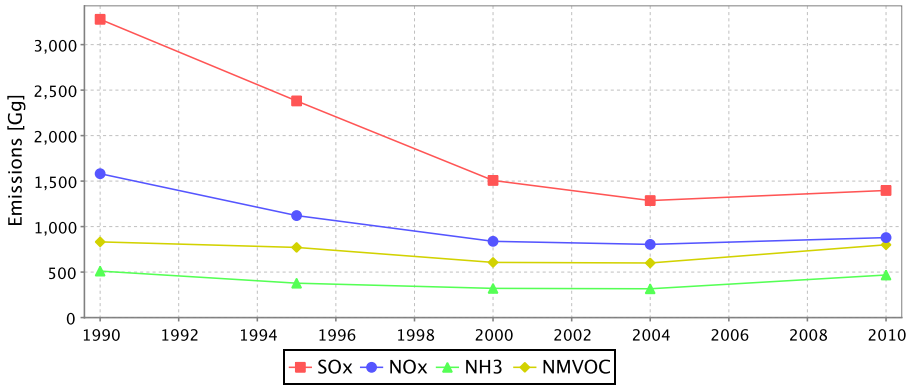

Acc. Exceedances [eq/ha/y]
225
200
175
150
125
100
75
50
25
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

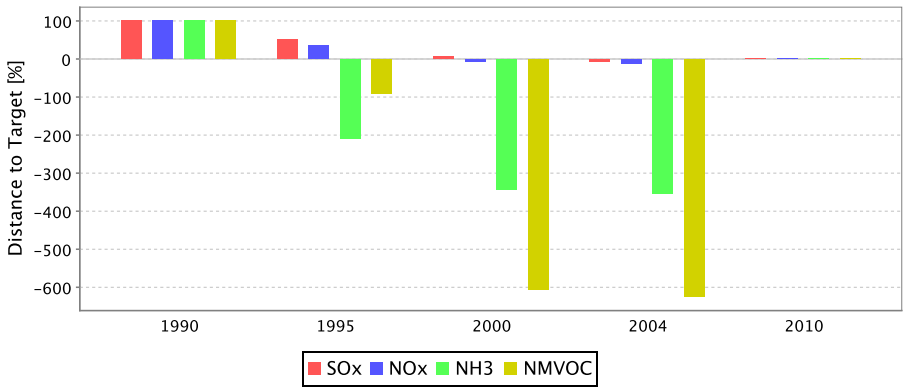

Unprotected Ecosystem Area [%]
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

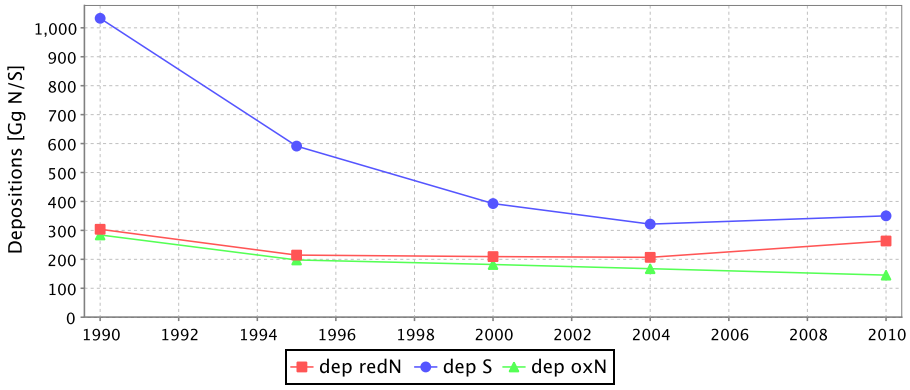

ppb.days
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

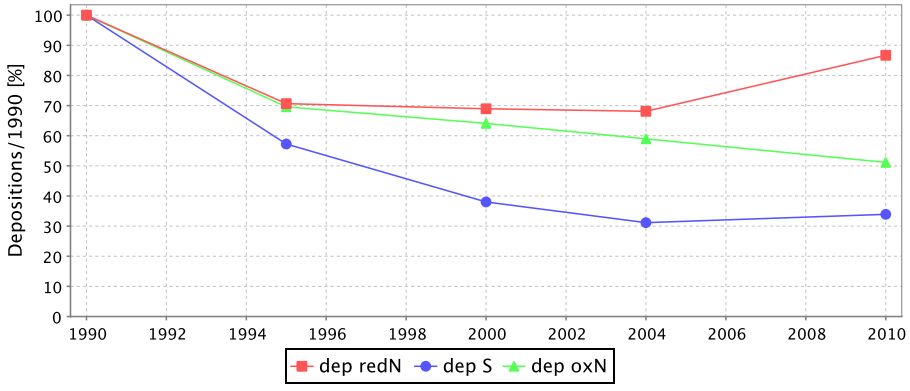

Ozone Fluxes [mmol/m²]
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

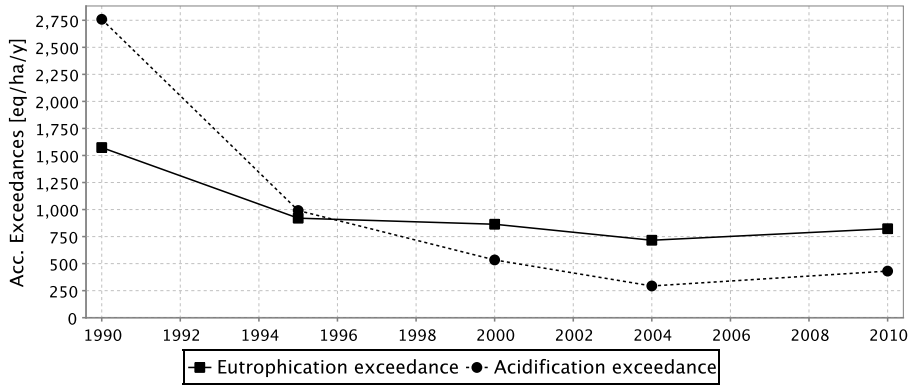
Poland (Signatory to the Gothenburg Protocol)

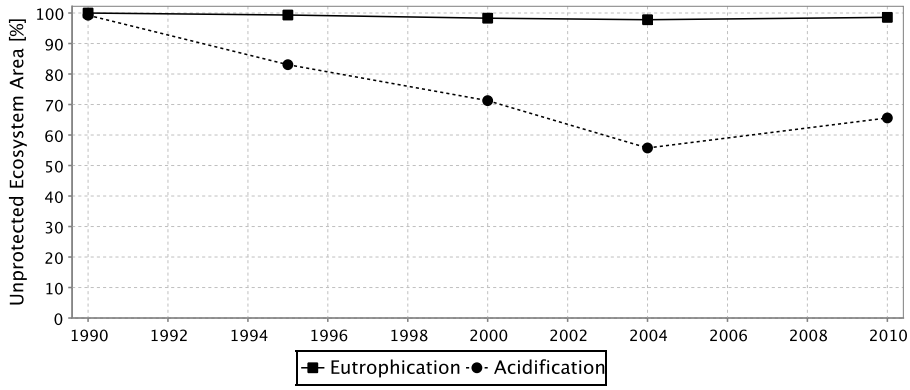


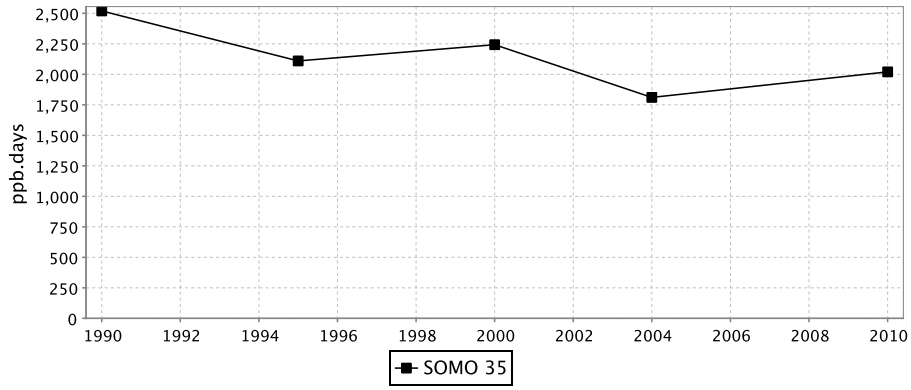


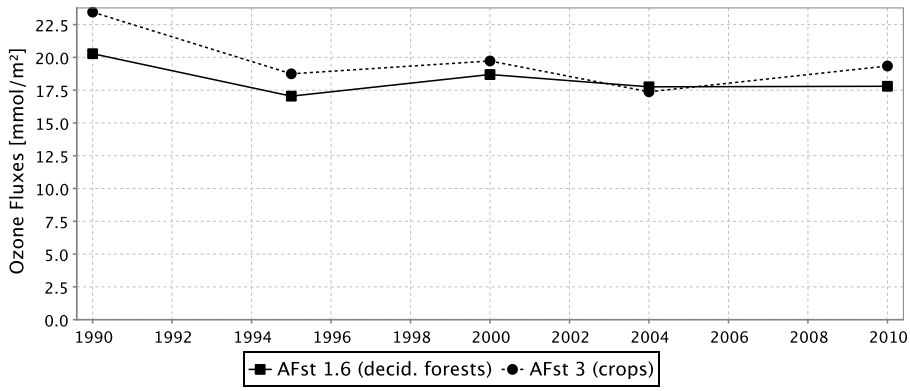




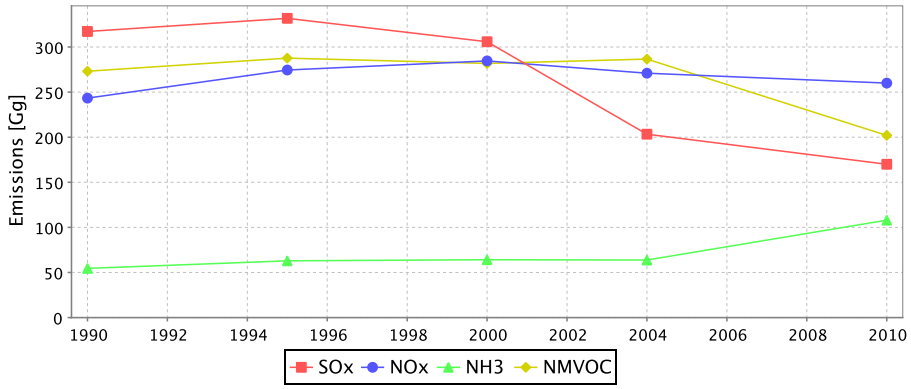

Acc. Exceedances [eq/ha/y]
2,750
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

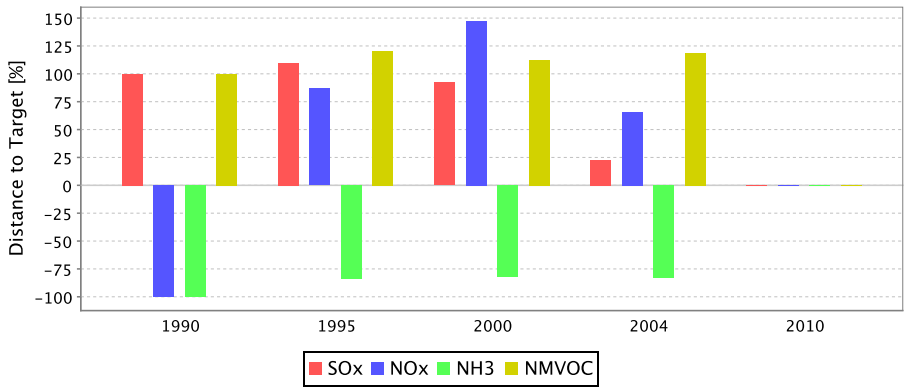

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

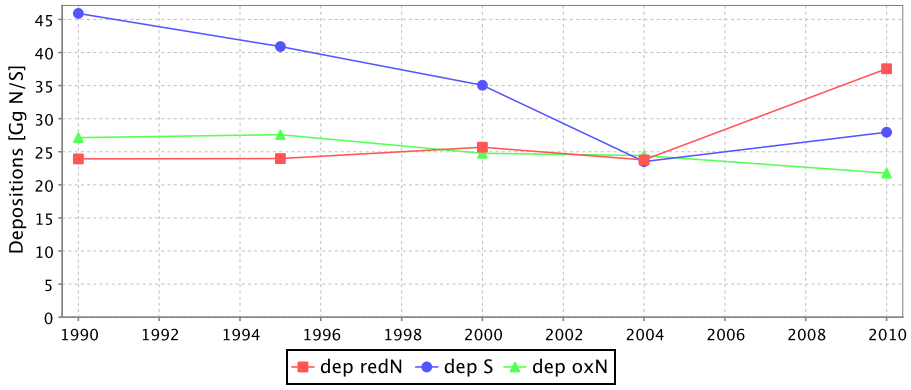

ppb.days
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

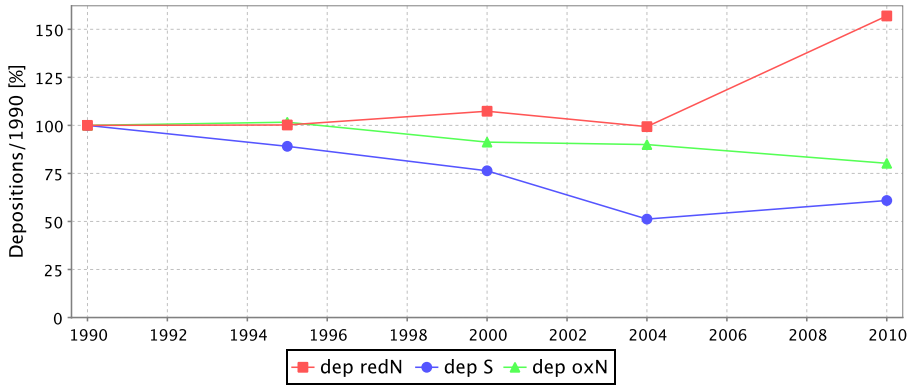

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

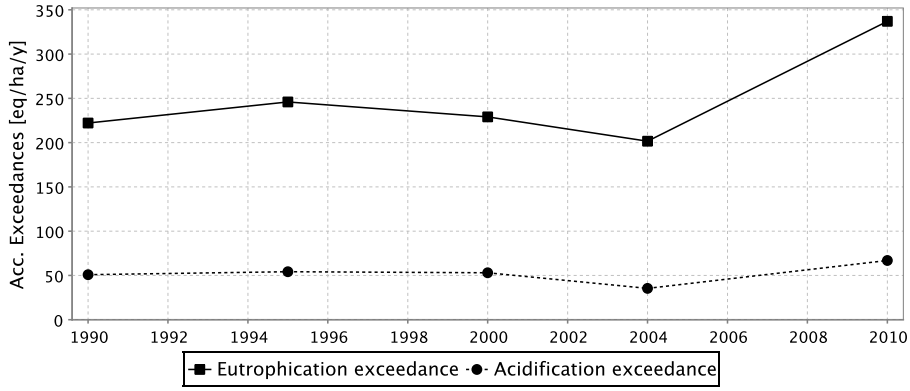
Portugal (Party to the Gothenburg Protocol)

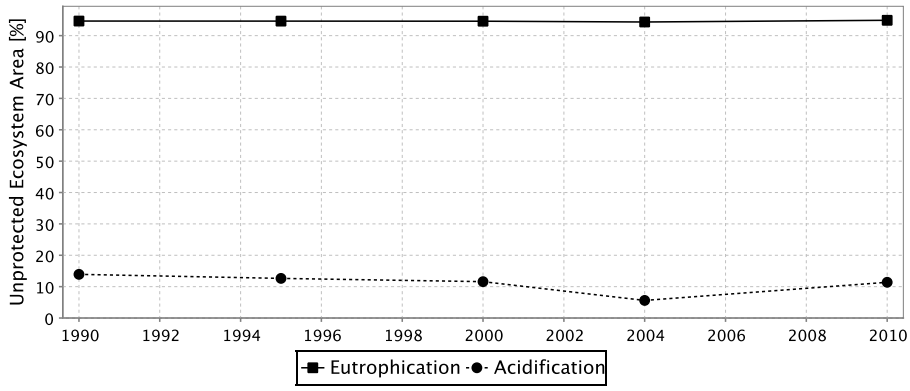


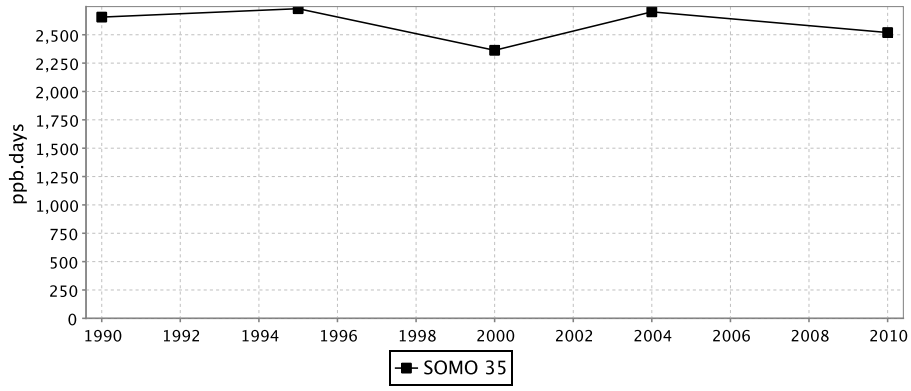


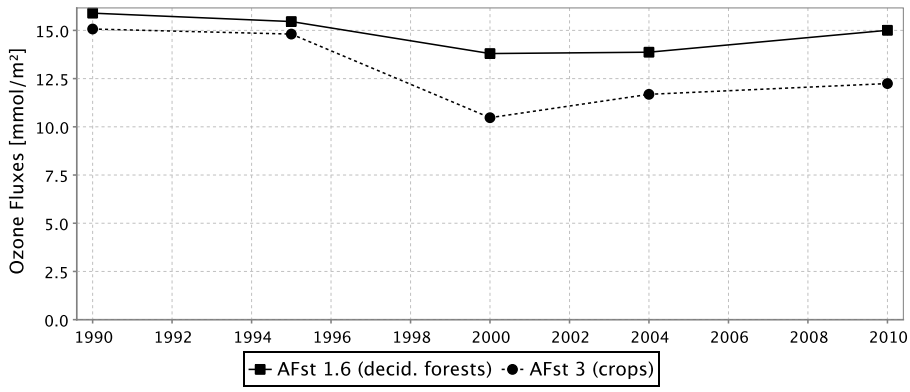




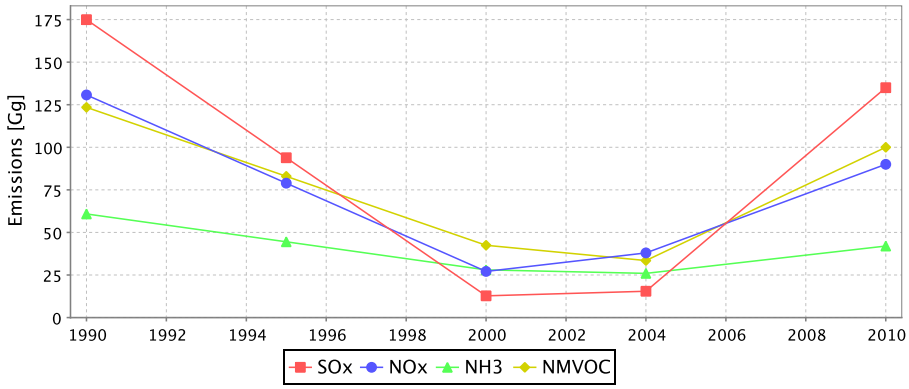

Acc. Exceedances [eq/ha/y]
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

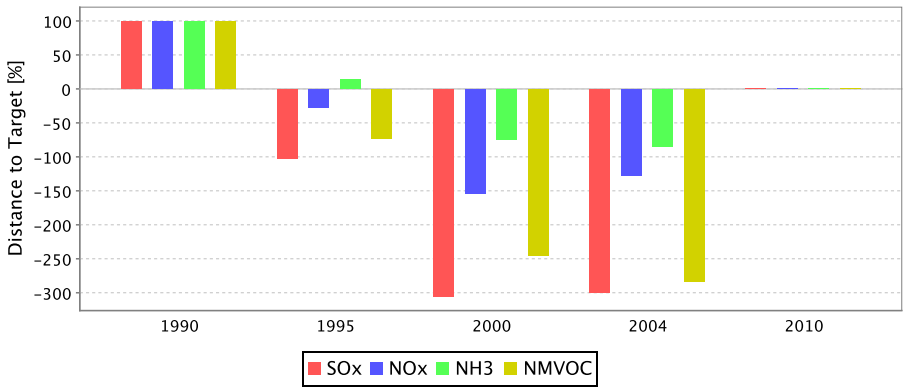

Unprotected Ecosystem Area [%]
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

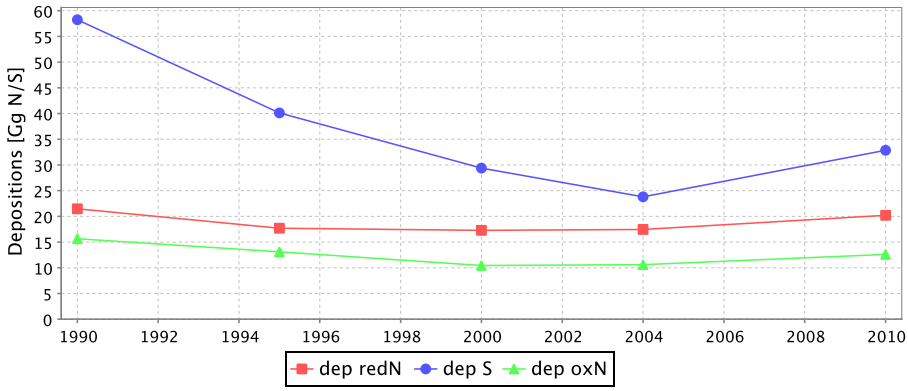

ppb.days
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

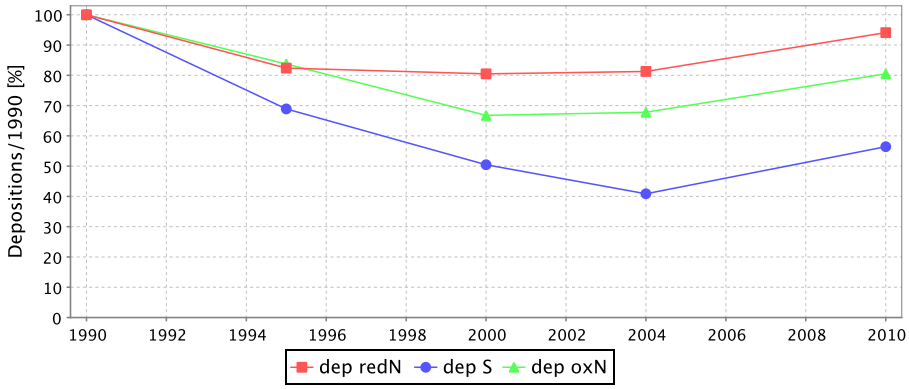

Ozone Fluxes [mmol/m²]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

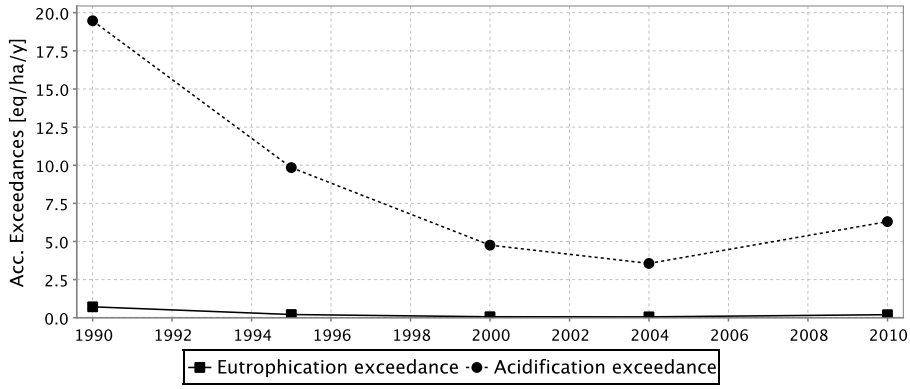
The Republic of Moldova (Signatory to the Gothenburg Protocol)

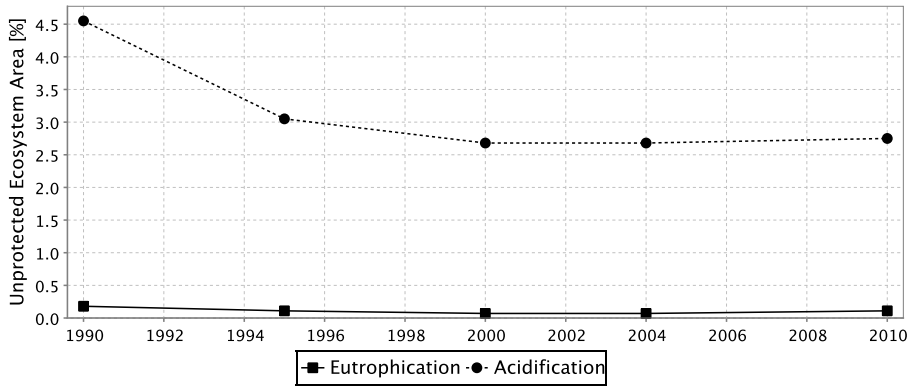


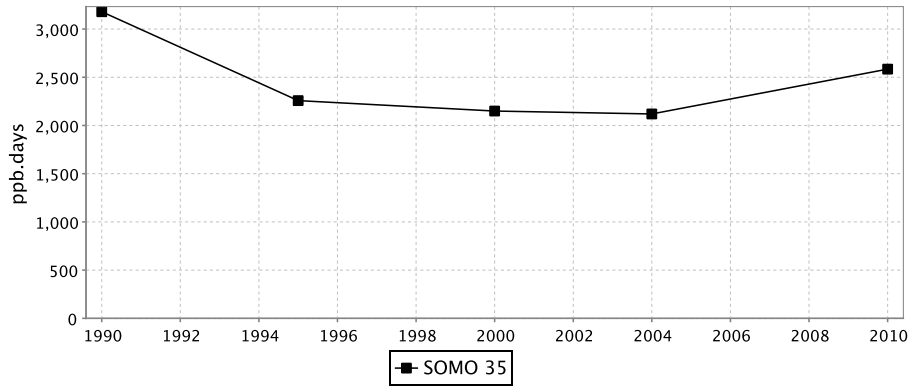


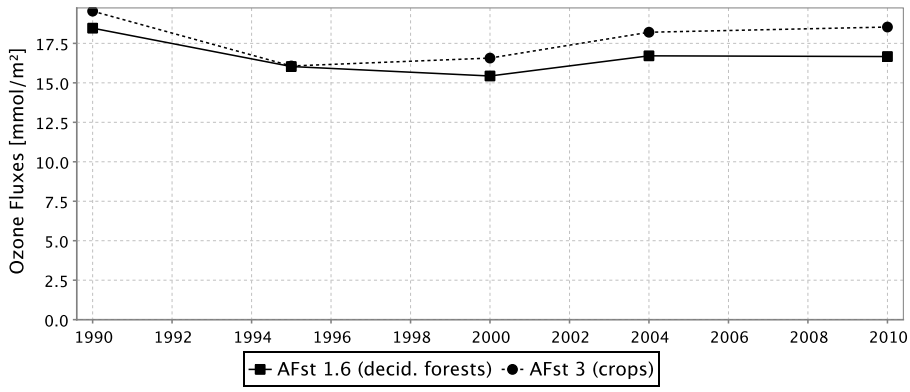




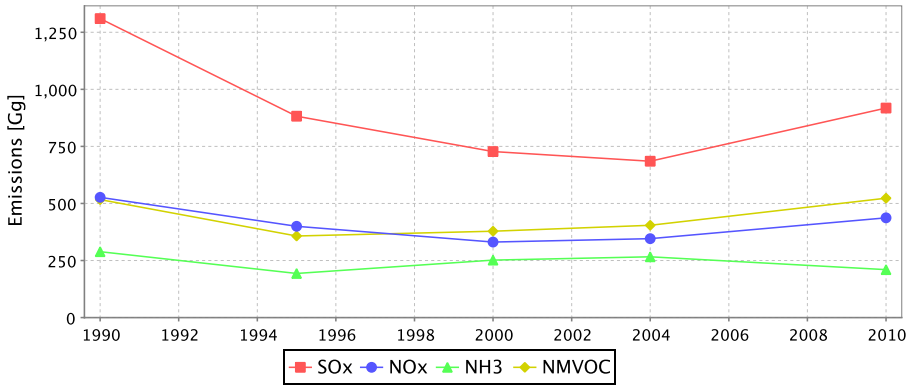

Acc. Exceedances [eq/ha/y]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication exceedance
Acidification exceedance

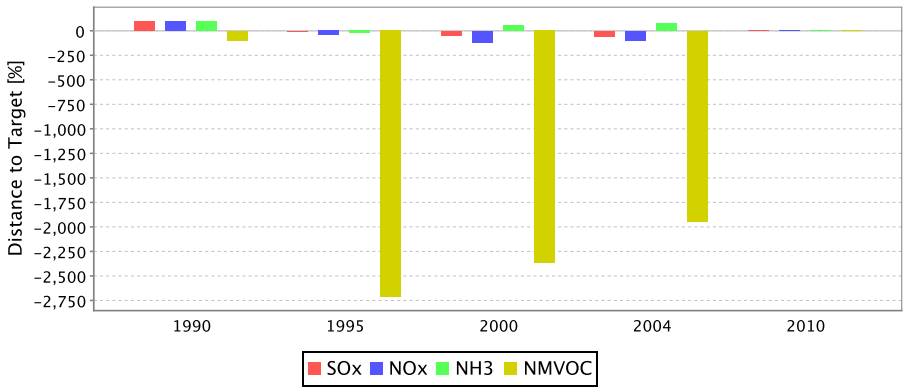

Unprotected Ecosystem Area [%]
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Eutrophication
Acidification

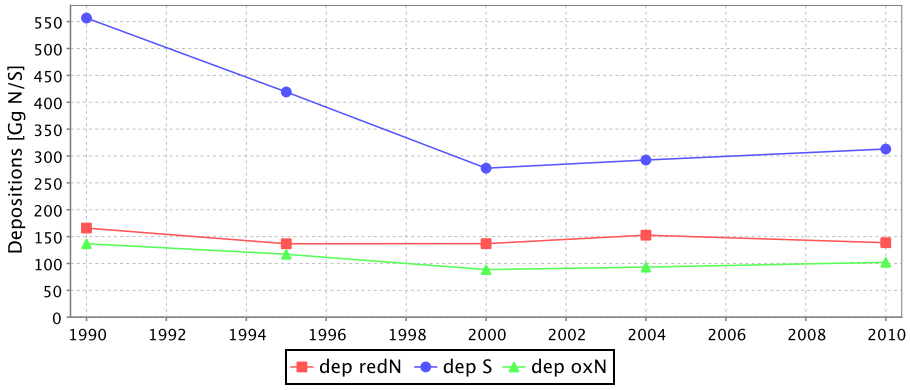

ppb.days
3,000
2,500
2,000
1,500
1,000
500
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
SOMO 35

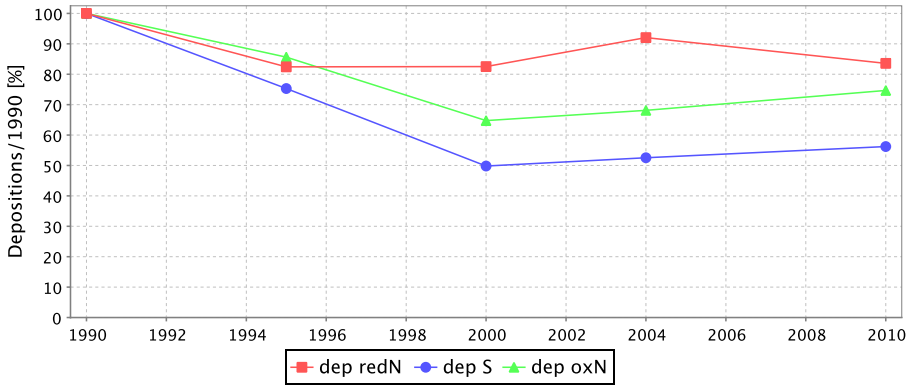

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

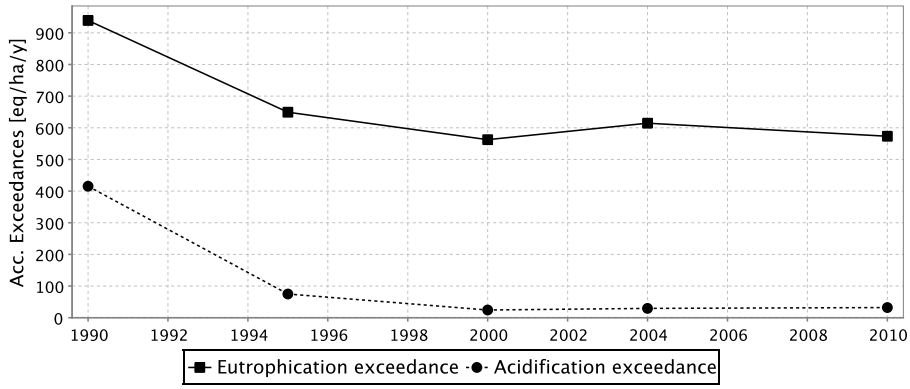
Romania (Party to the Gothenburg Protocol)

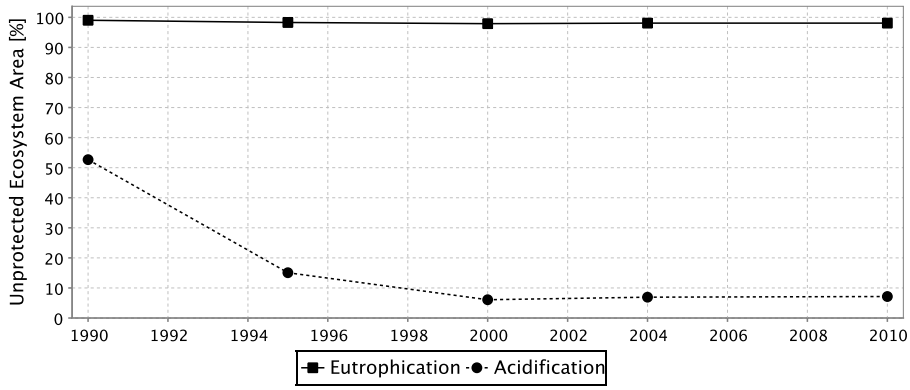


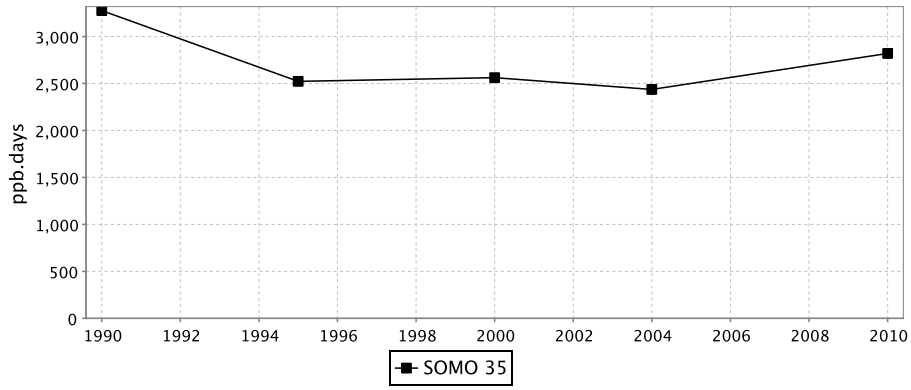


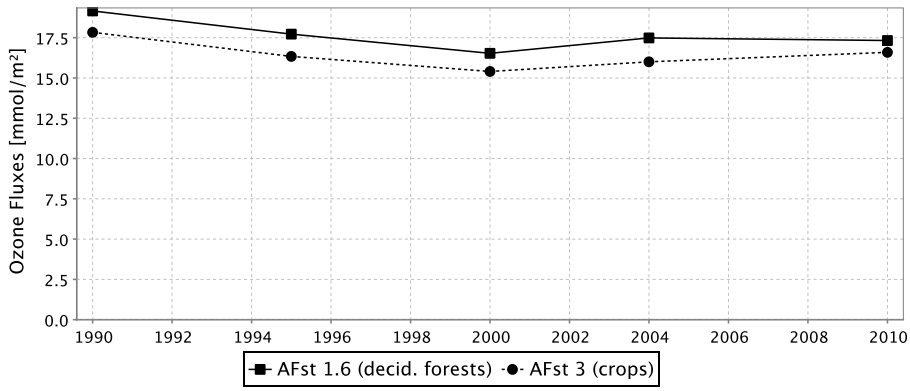




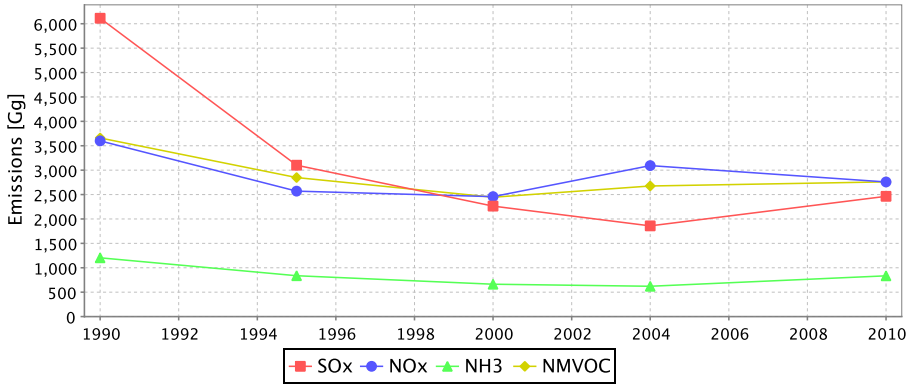

Acc. Exceedances [eq/ha/y]
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

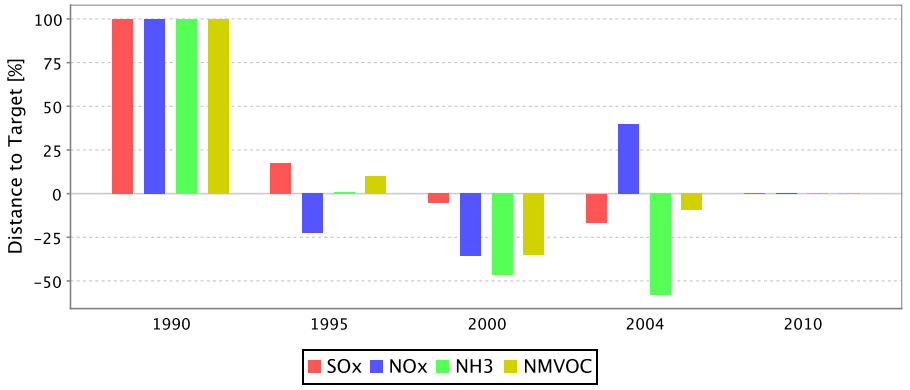

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

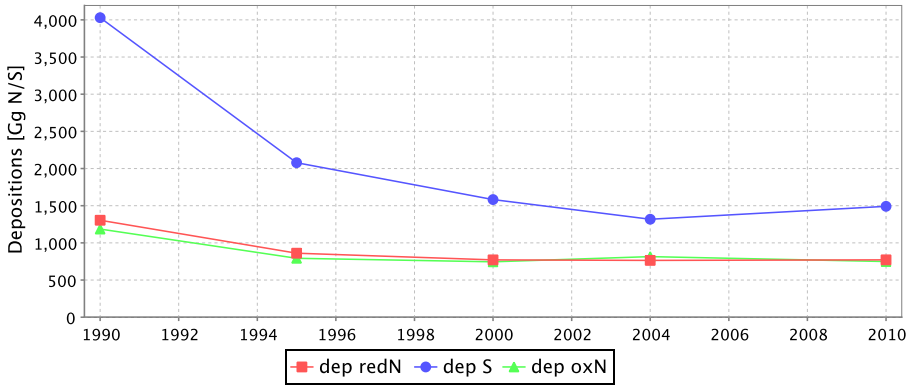

ppb.days
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

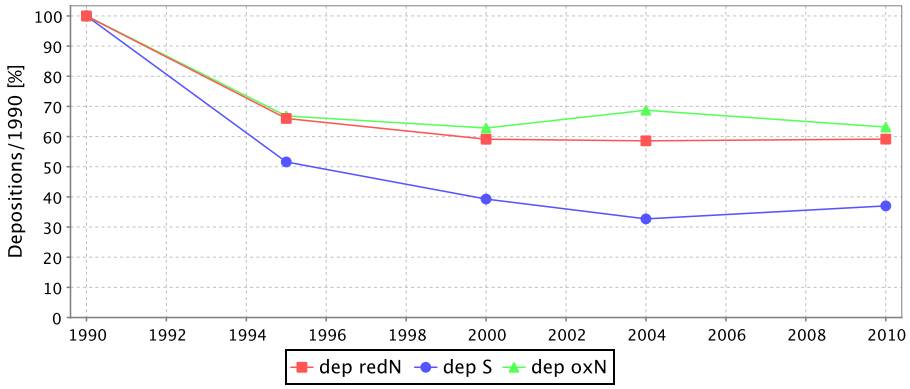

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

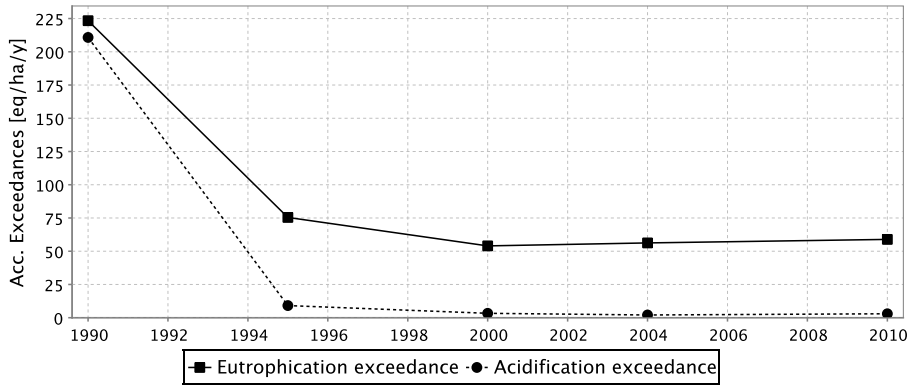
The Russian Federation (applies to RU, not to its PEMA), Non-Signatory

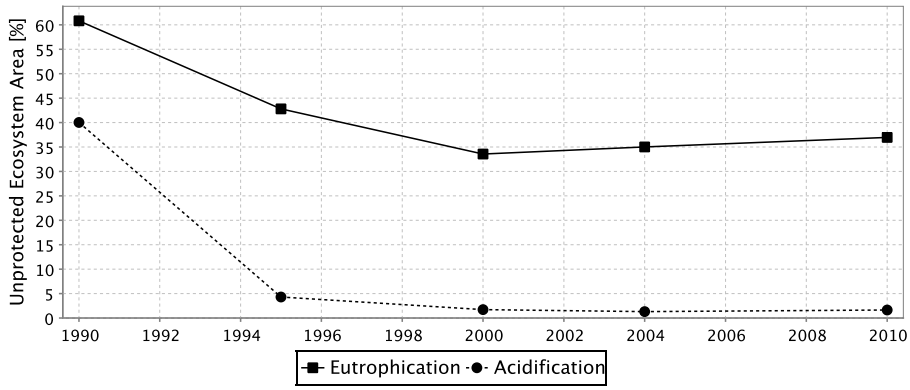




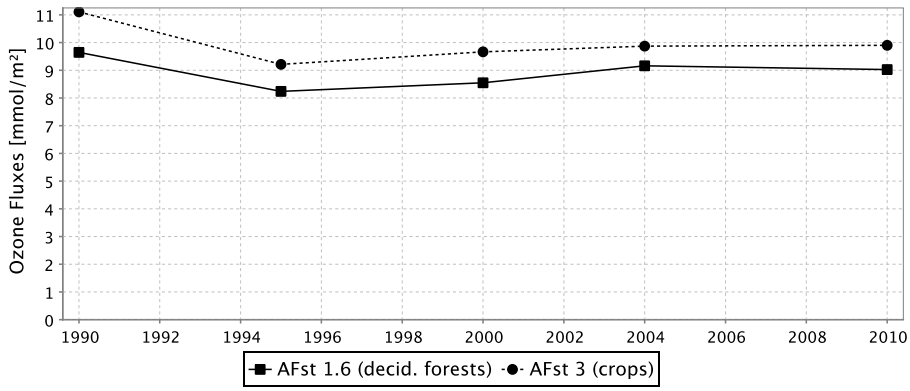




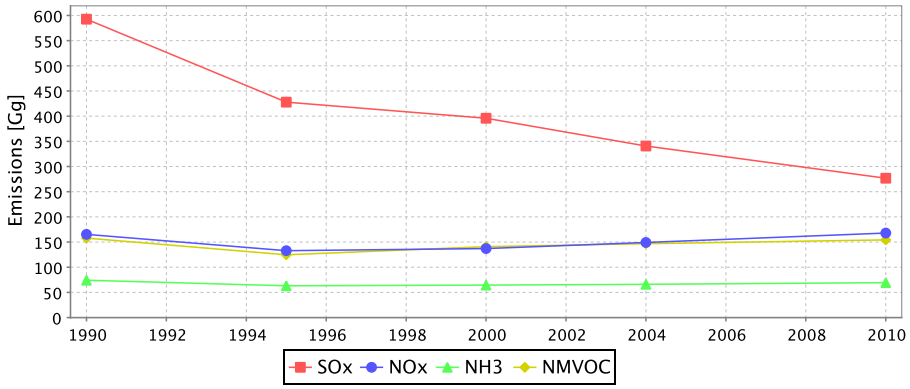

Acc. Exceedances [eq/ha/y]
225
200
175
150
125
100
75
50
25
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

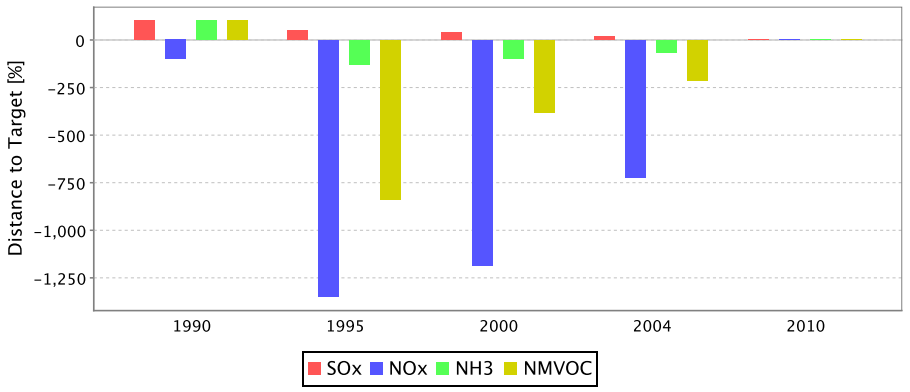

Unprotected Ecosystem Area [%]
60
55
50
45
40
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

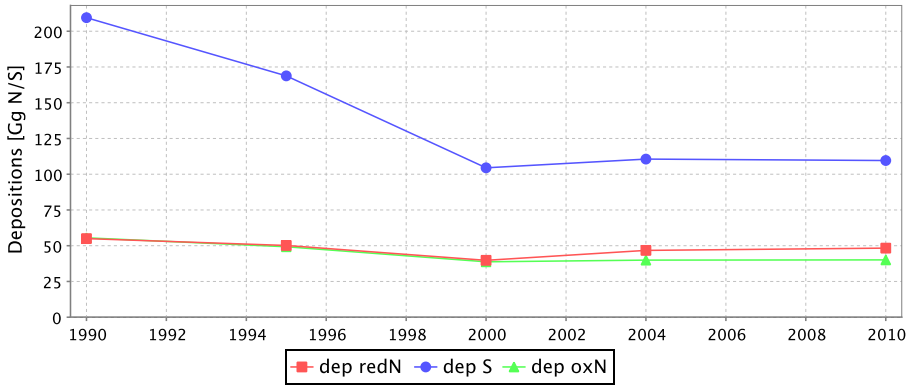
ppb.days
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

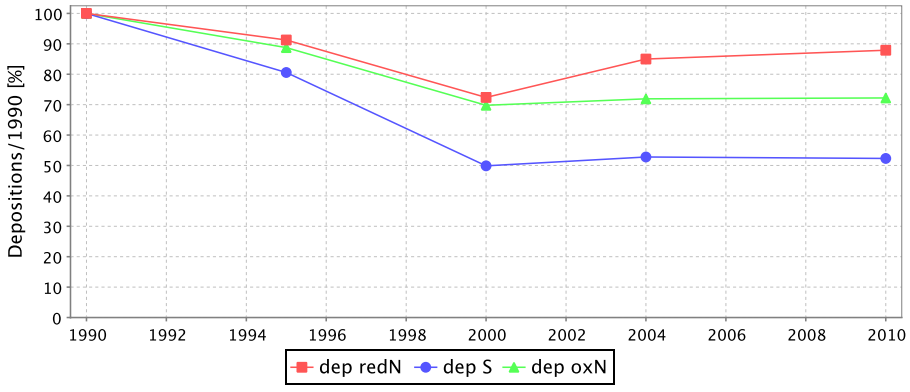

Ozone Fluxes [mmol/m²]
11
10
9
8
7
6
5
4
3
2
1
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

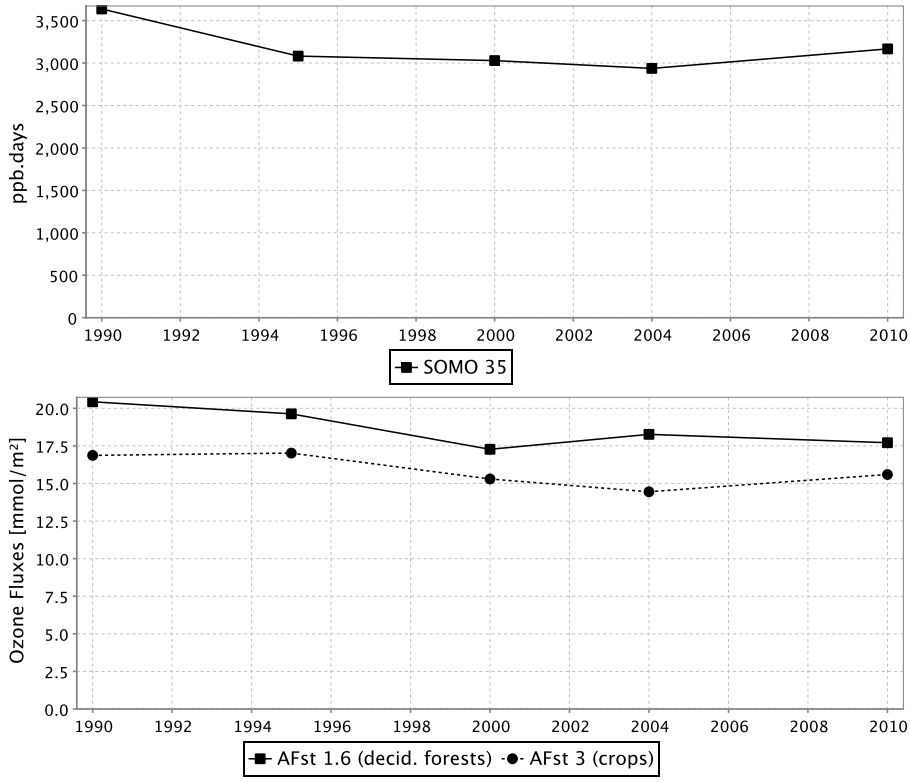
Serbia and Montenegro (Not included in the Gothenburg Protocol)



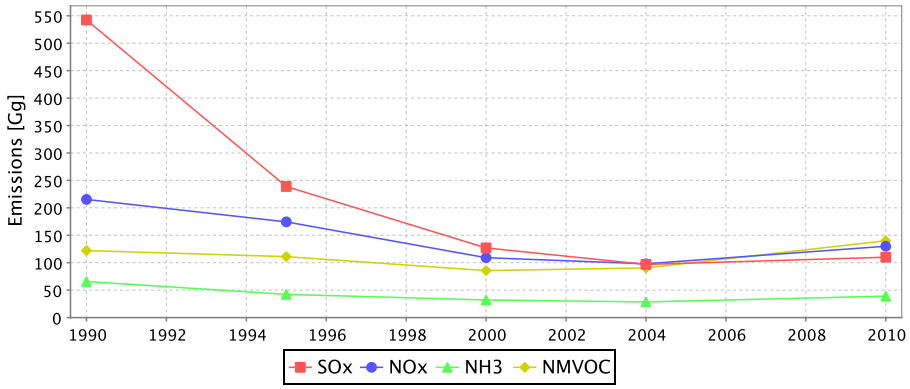


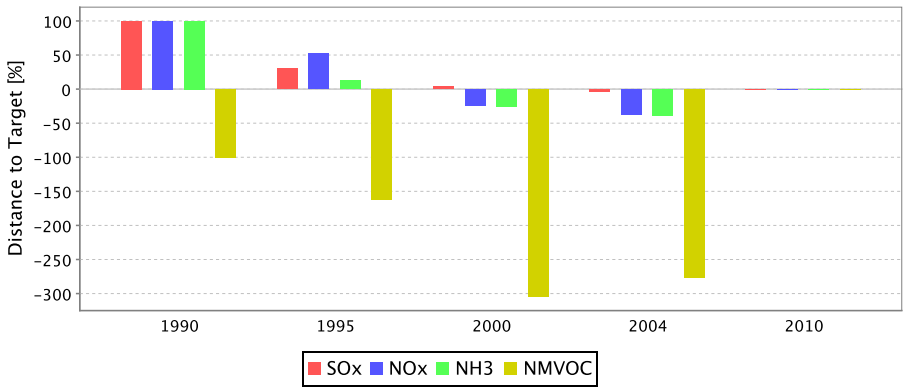


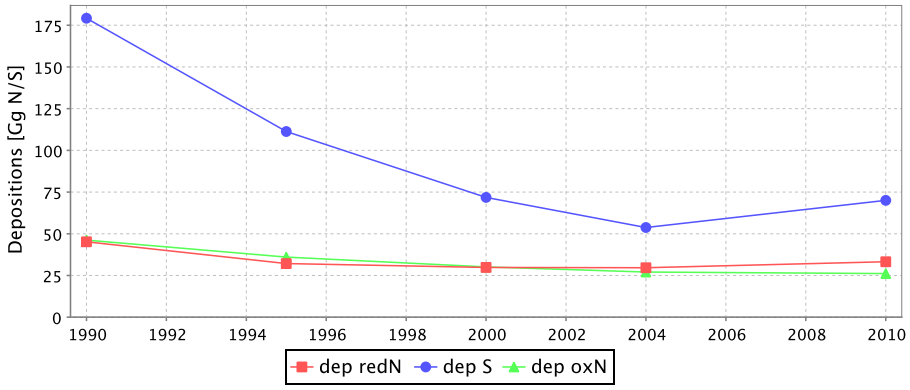


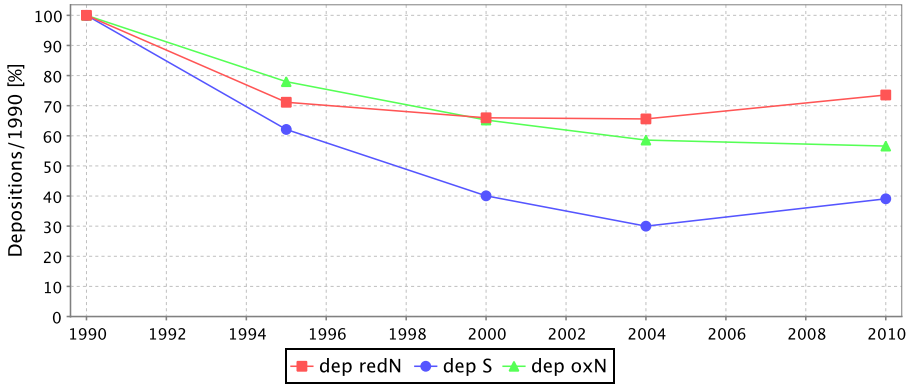

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

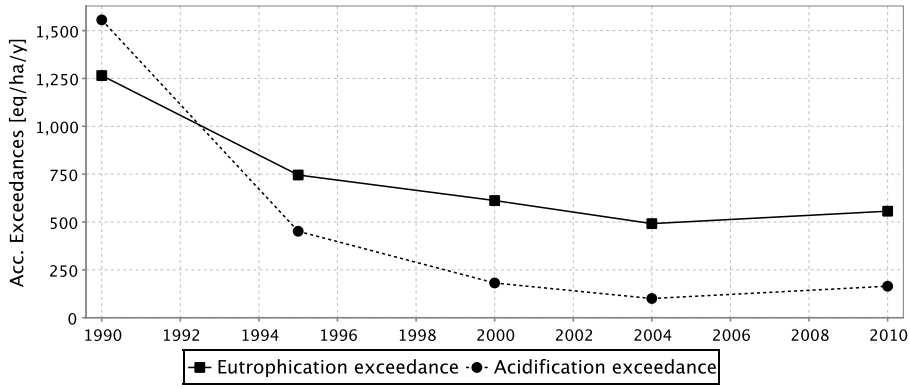
Slovakia (Party to the Gothenburg Protocol)

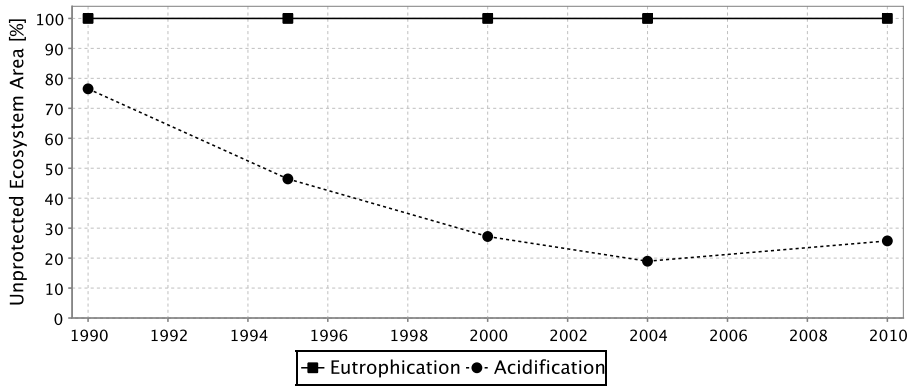


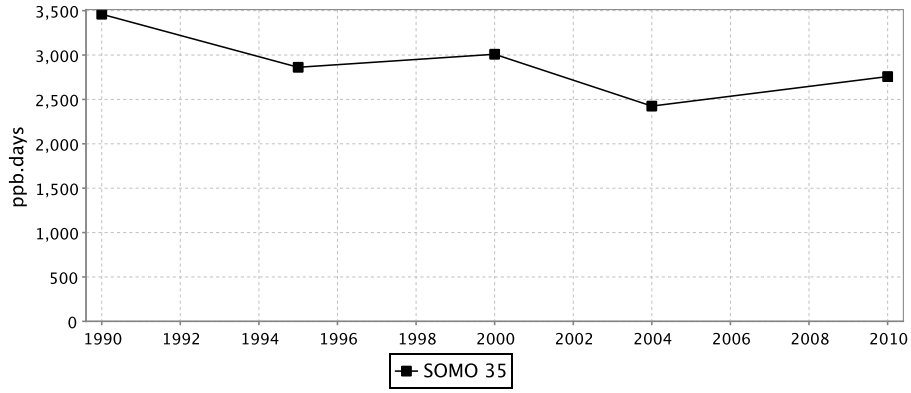


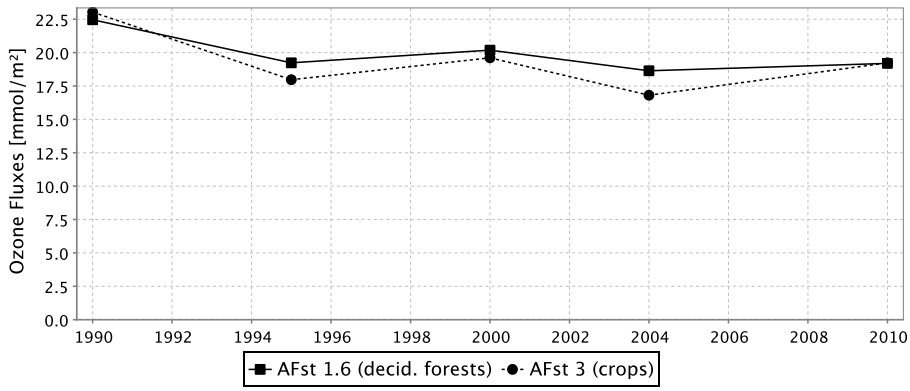




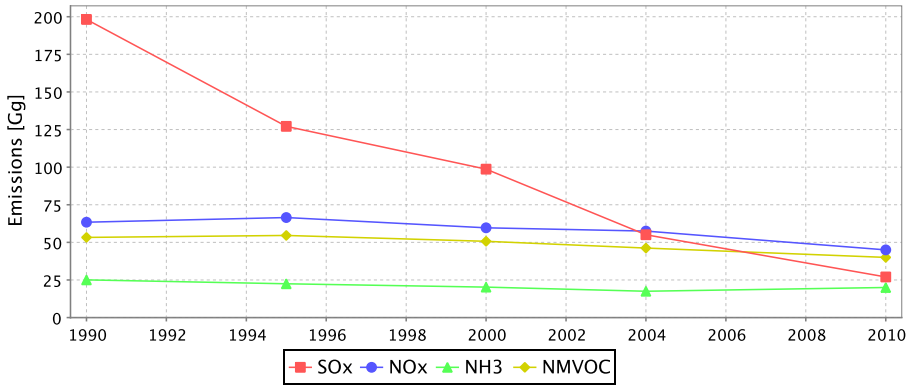

Acc. Exceedances [eq/ha/y]
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

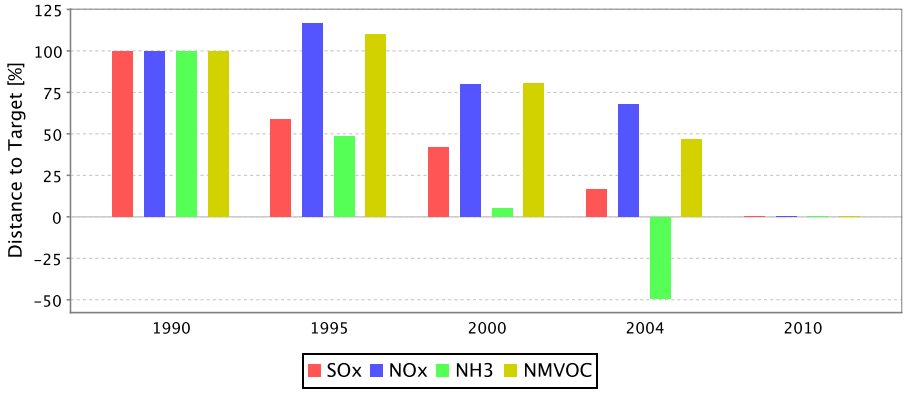

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

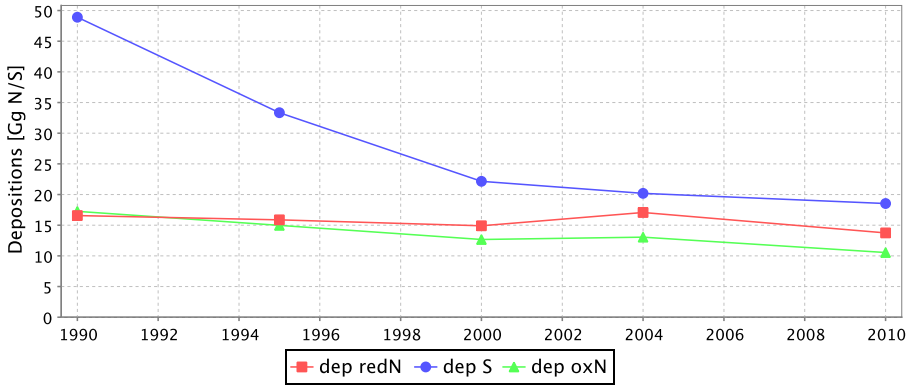

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

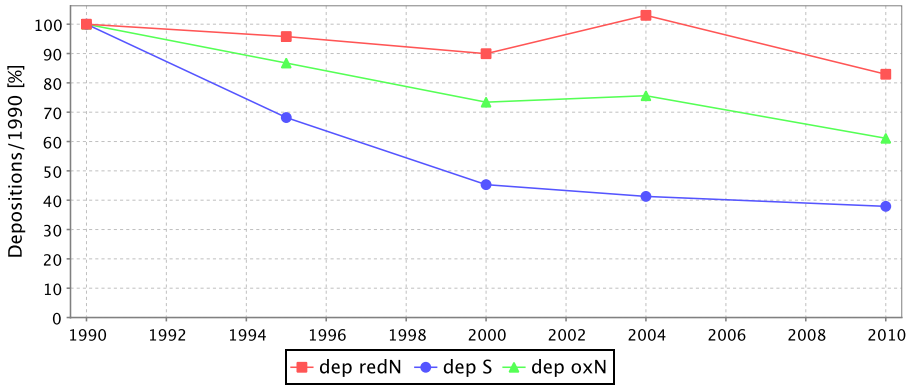

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

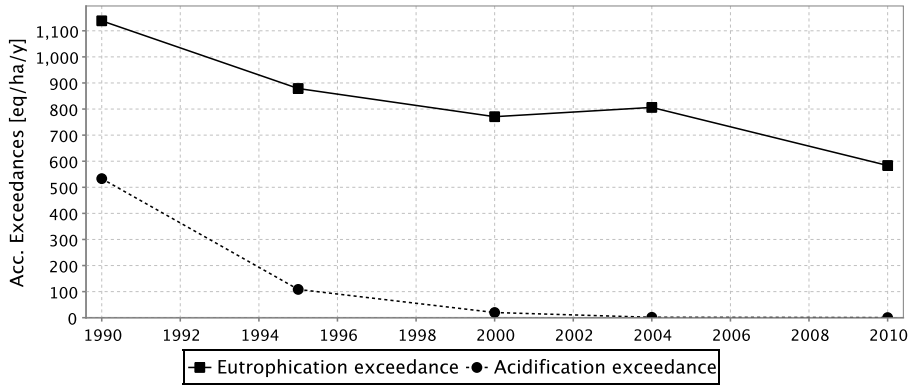
Slovenia (Party to the Gothenburg Protocol)

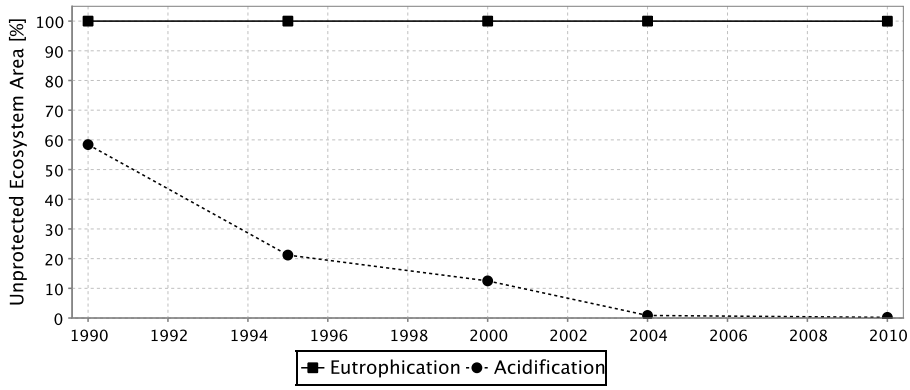


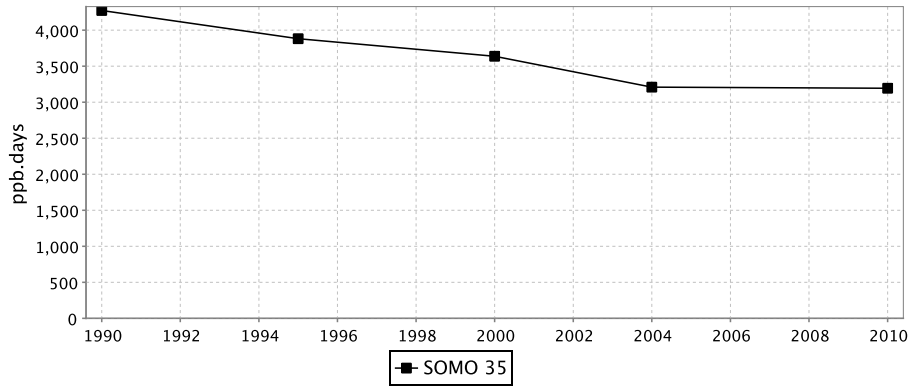


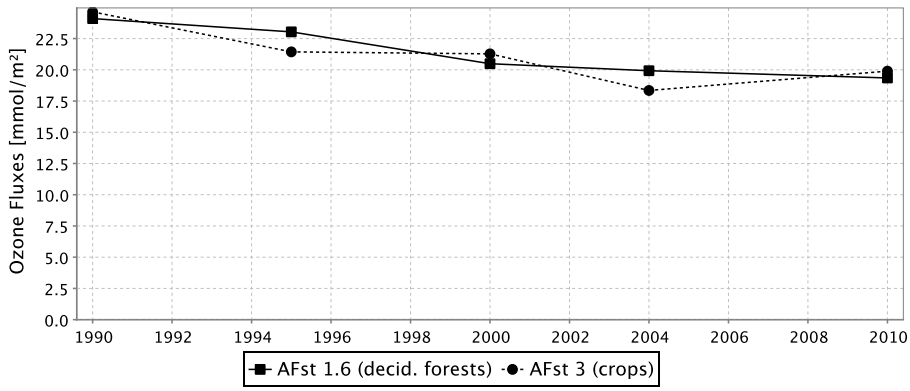




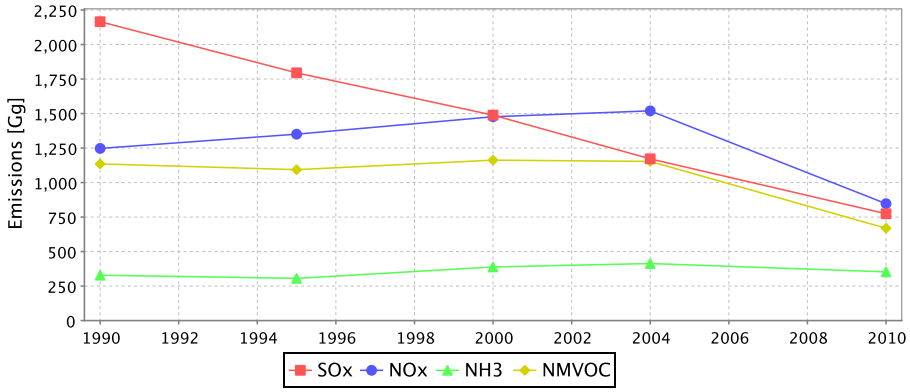

Acc. Exceedances [eq/ha/y]
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

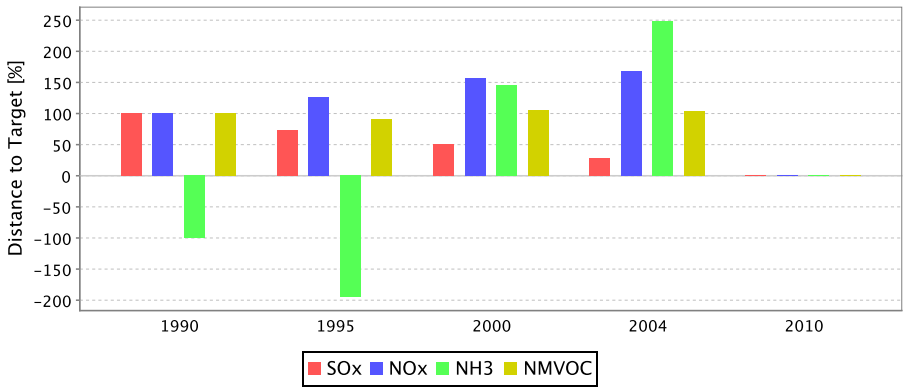

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

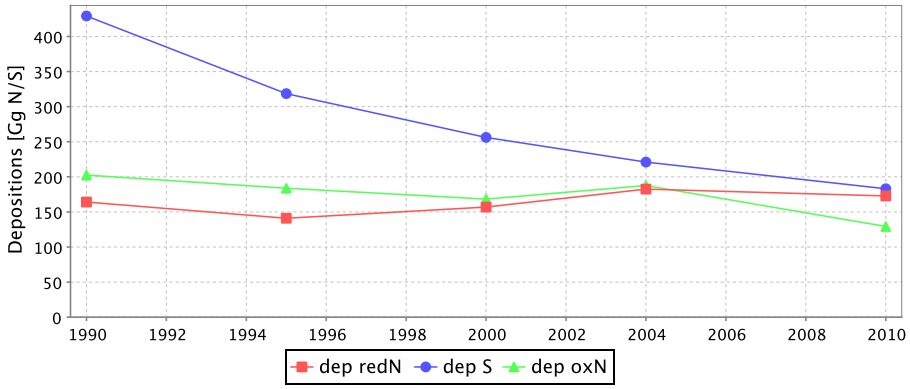

ppb.days
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

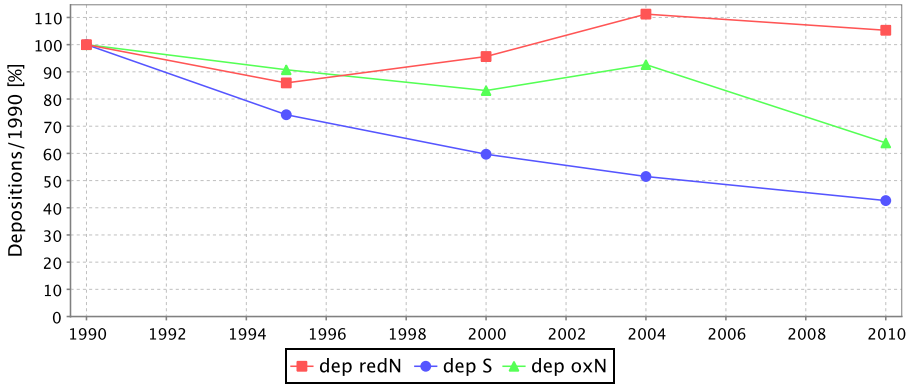

Ozone Fluxes [mmol/m²]
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

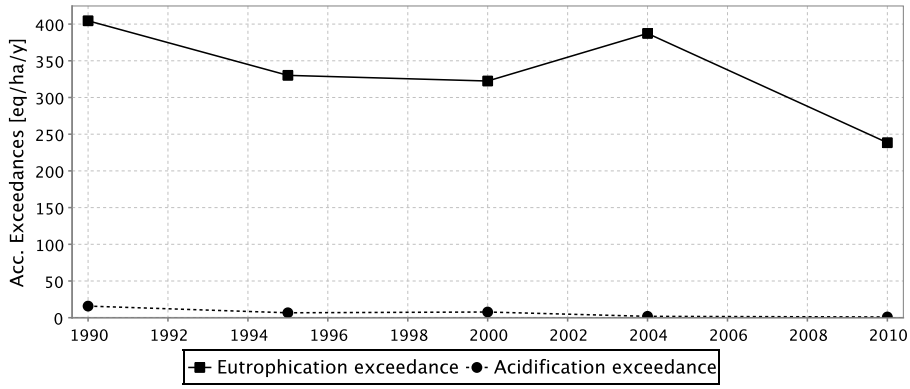
Spain (Party to the Gothenburg Protocol)

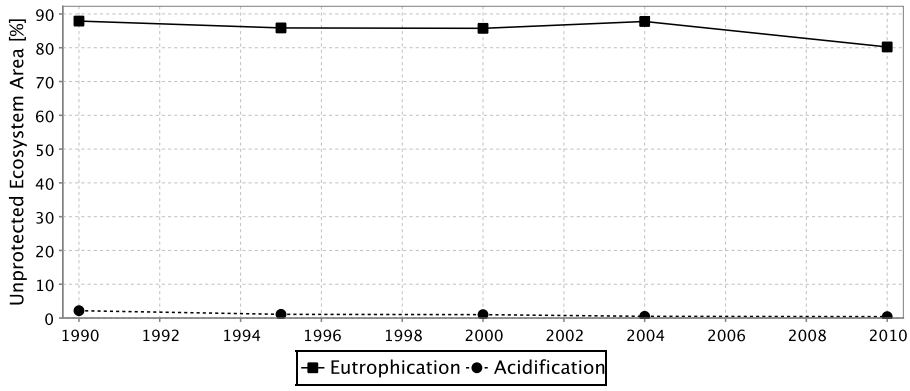


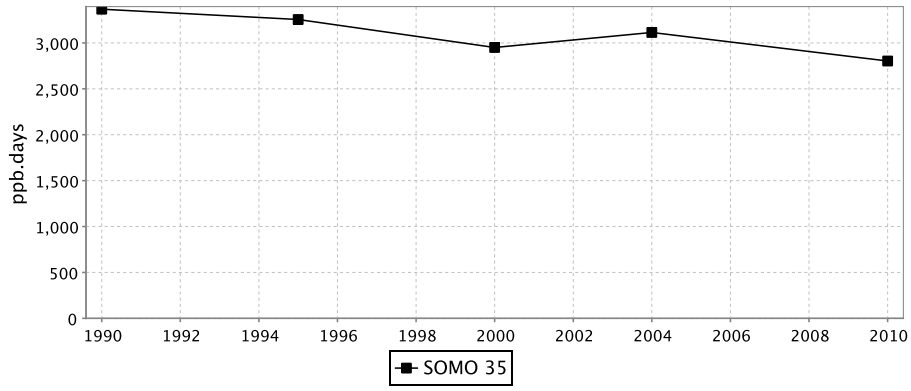


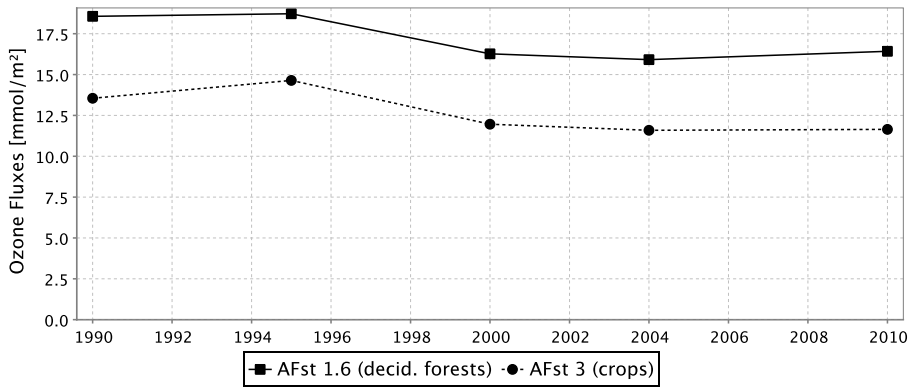




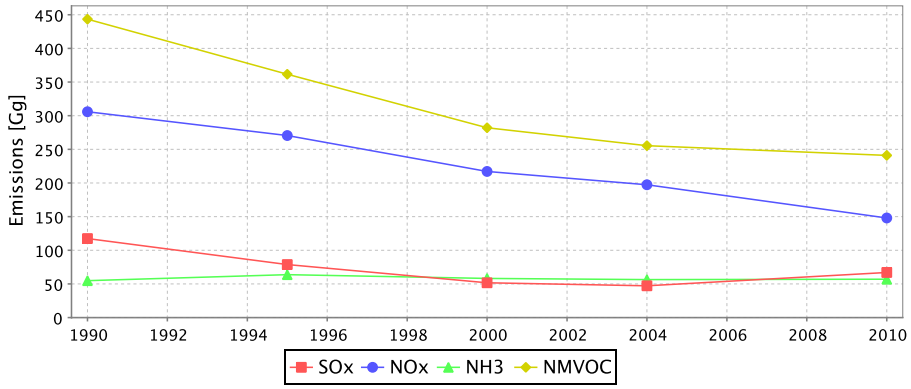

Acc. Exceedances [eq/ha/y]
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

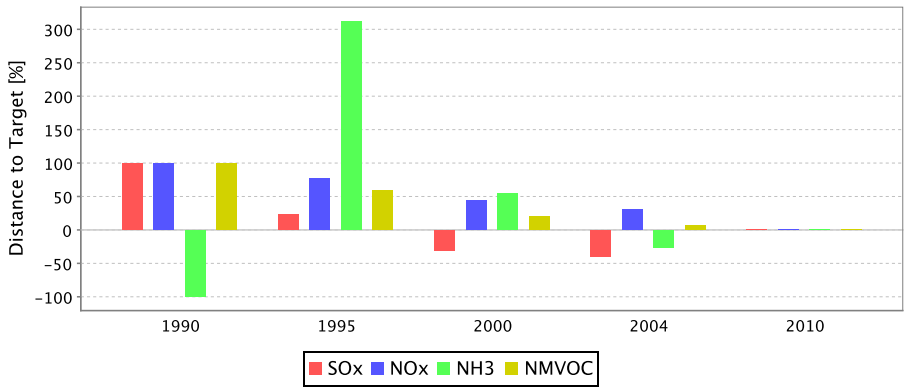

Unprotected Ecosystem Area [%]
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

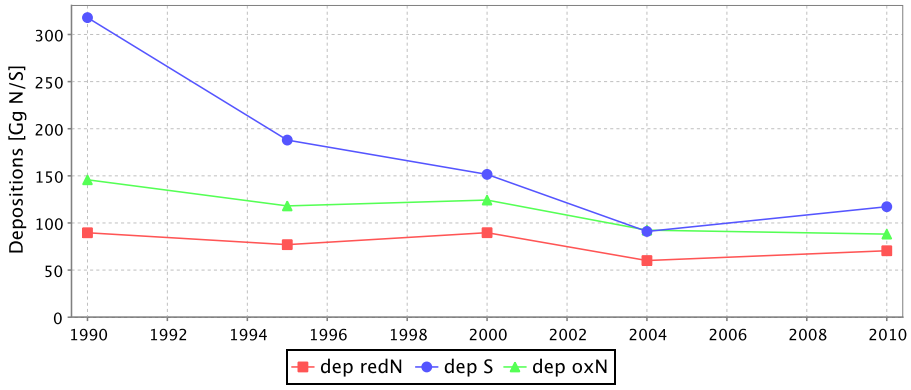

ppb.days
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

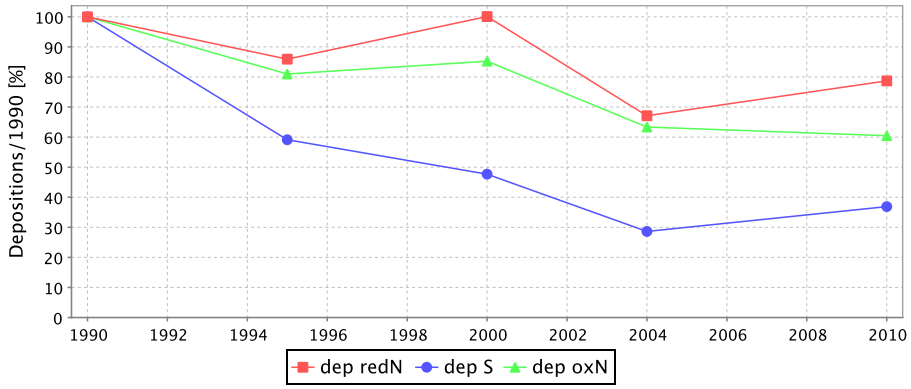

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

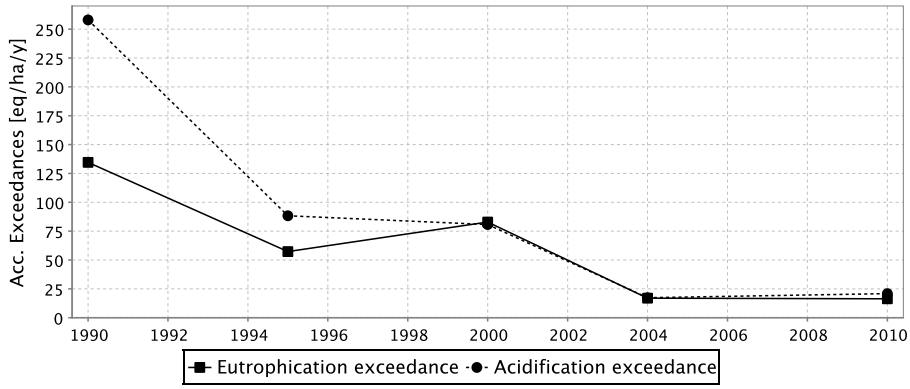
Sweden (Party to the Gothenburg Protocol)

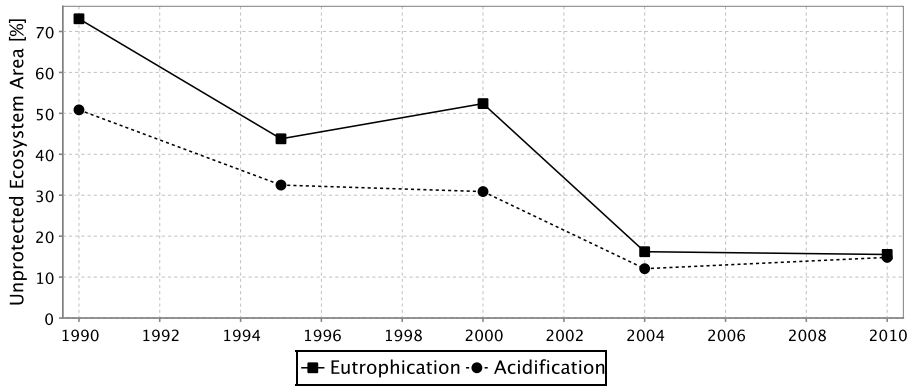


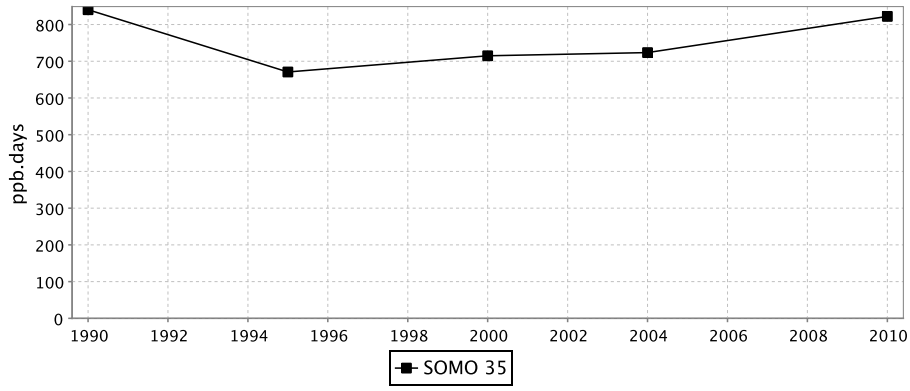


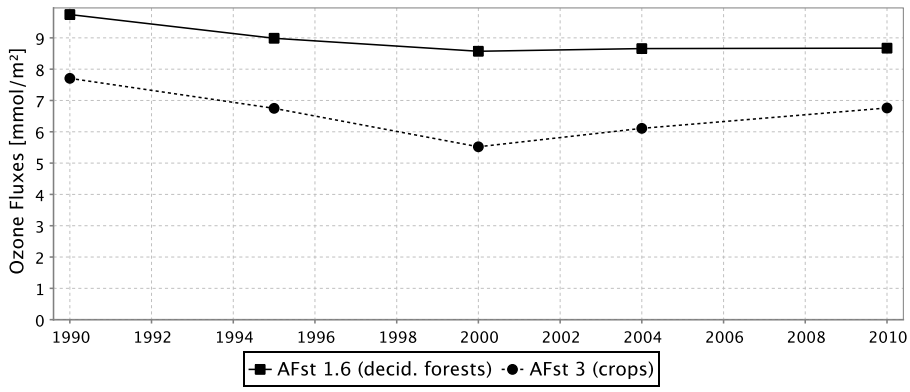




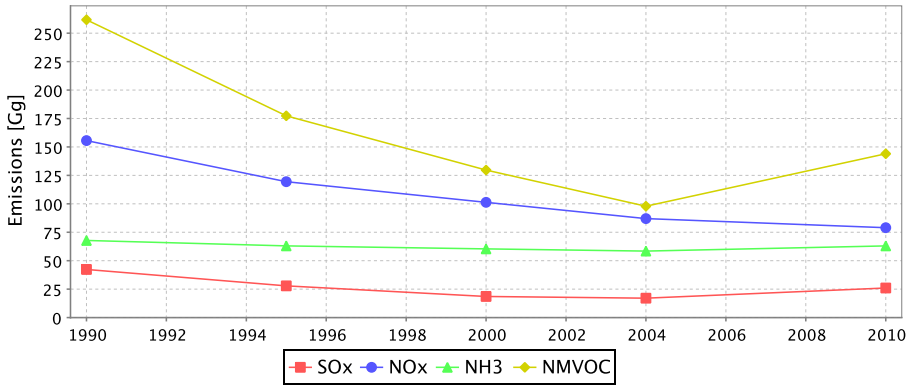

Acc. Exceedances [eq/ha/y]
250
225
200
175
150
125
100
75
50
25
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

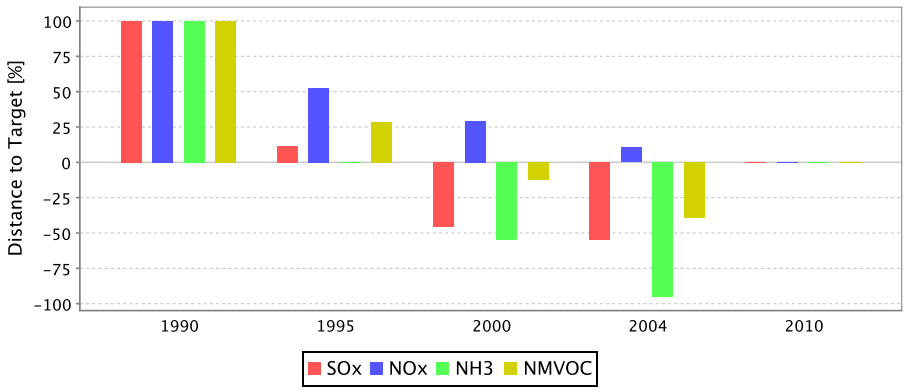

Unprotected Ecosystem Area [%]
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

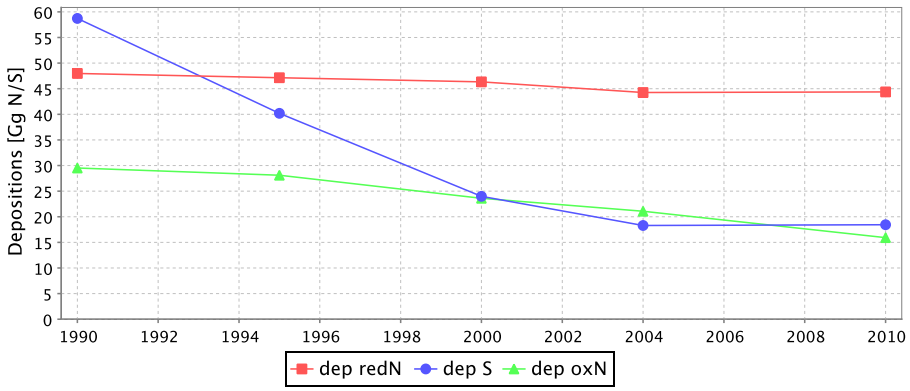

ppb.days
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

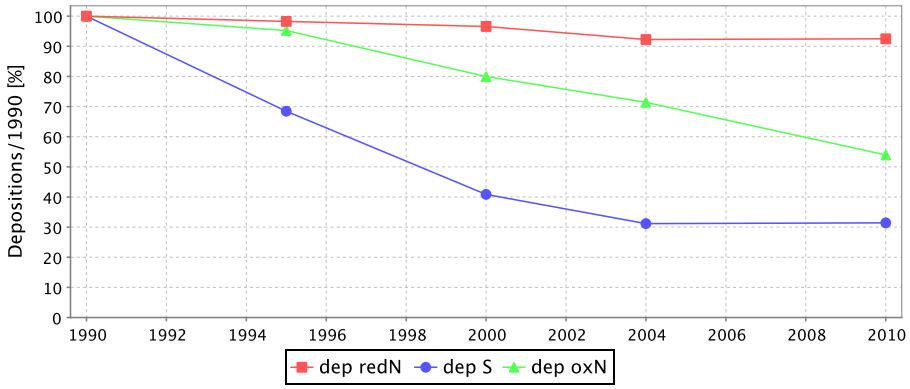

Ozone Fluxes [mmol/m²]
9
8
7
6
5
4
3
2
1
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

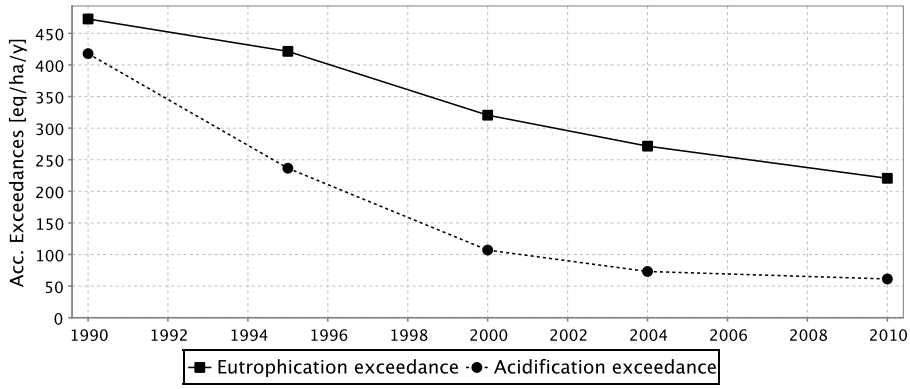
Switzerland (Party to the Gothenburg Protocol)

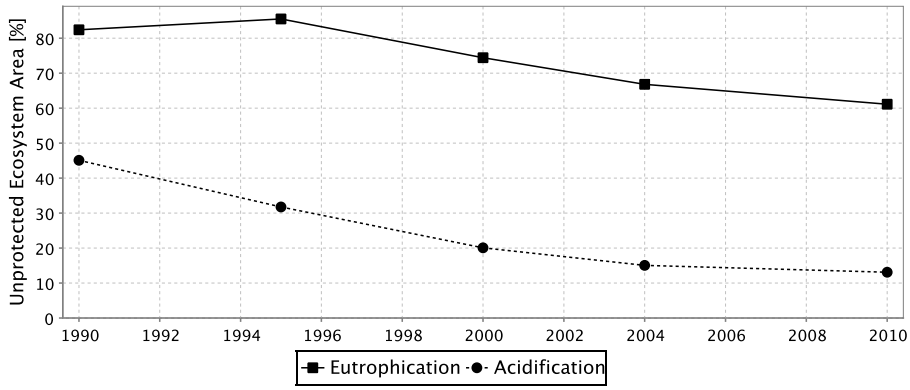


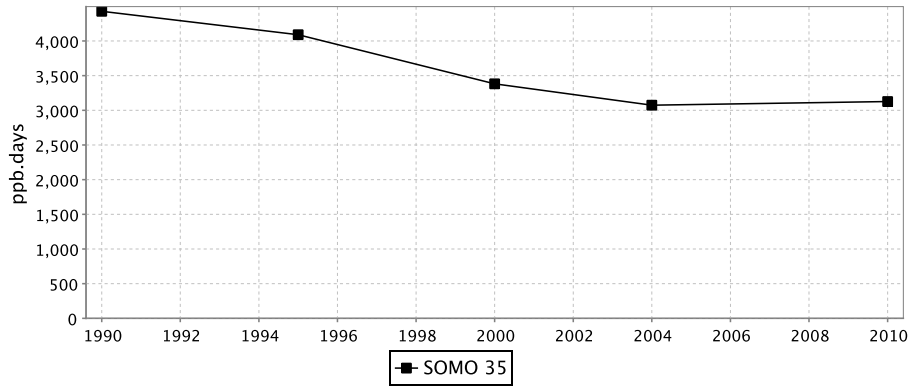


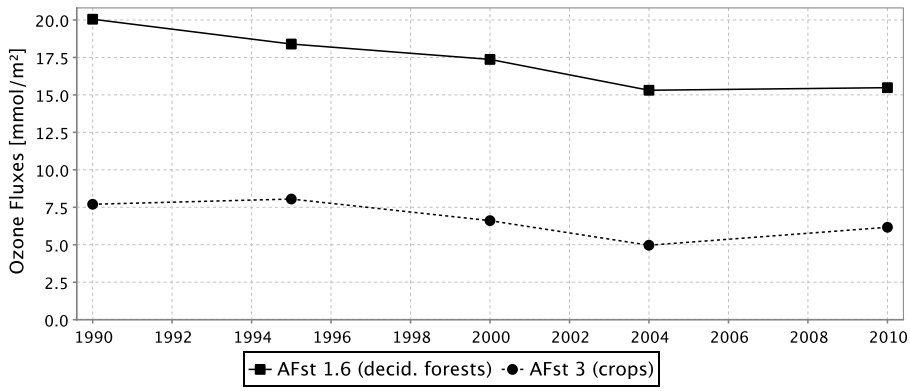




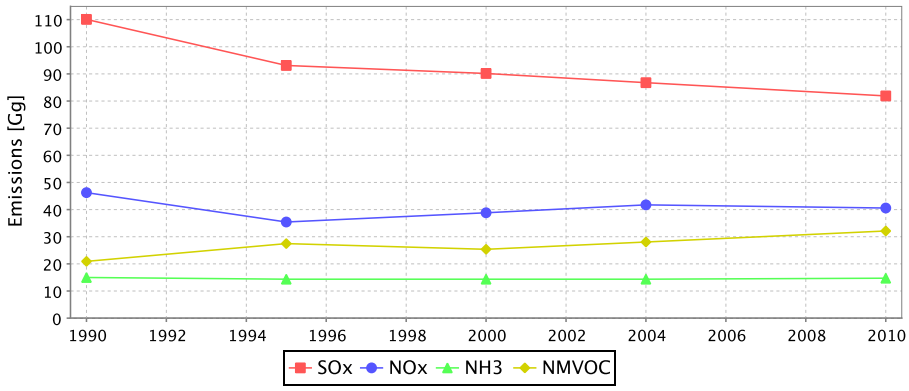

Acc. Exceedances [eq/ha/y]
0
50
100
150
200
250
300
350
400
450
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

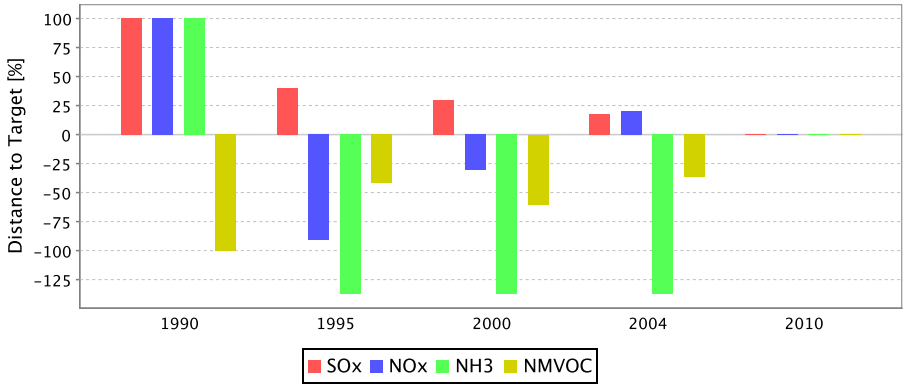

Unprotected Ecosystem Area [%]
0
10
20
30
40
50
60
70
80
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

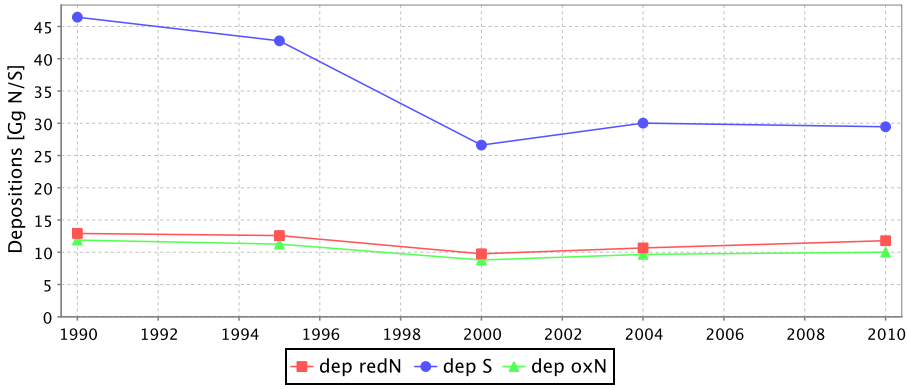

ppb.days
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

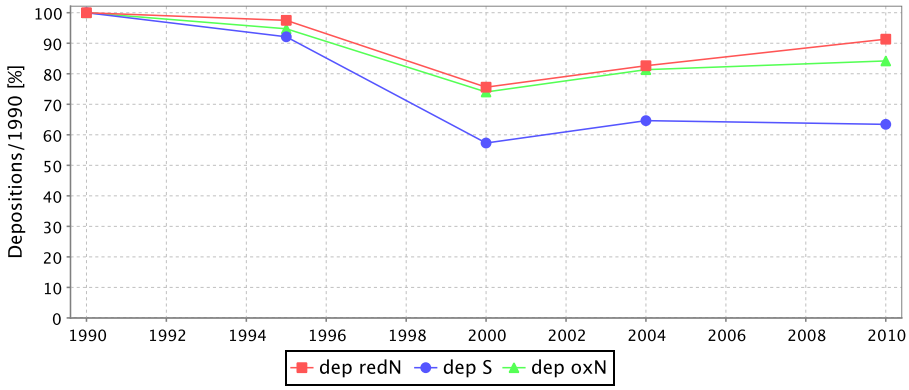

Ozone Fluxes [mmol/m²]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

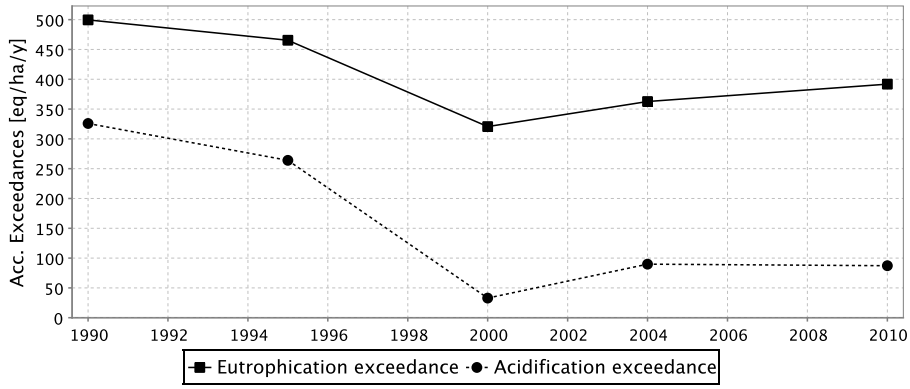
The former Yugoslav Republic of Macedonia (Not included in the Gothenburg Protocol)

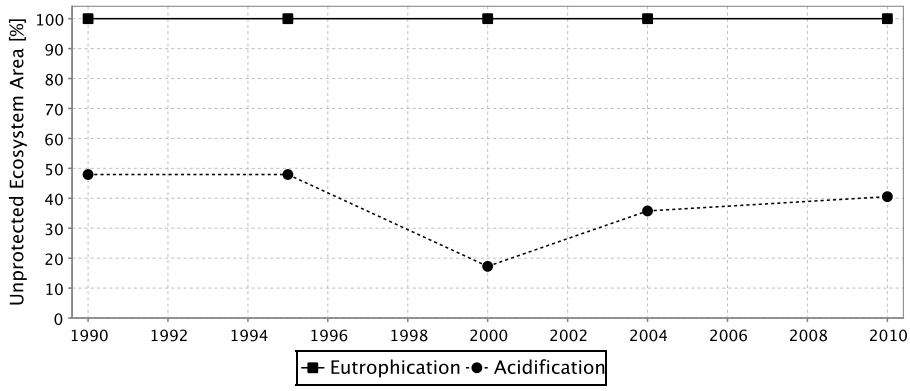


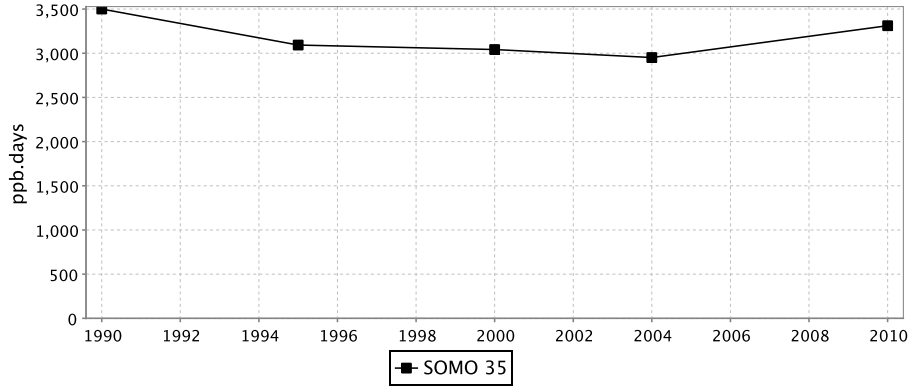


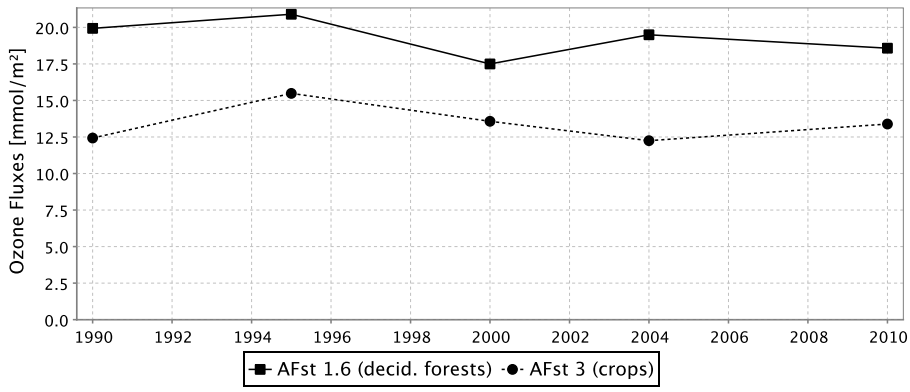




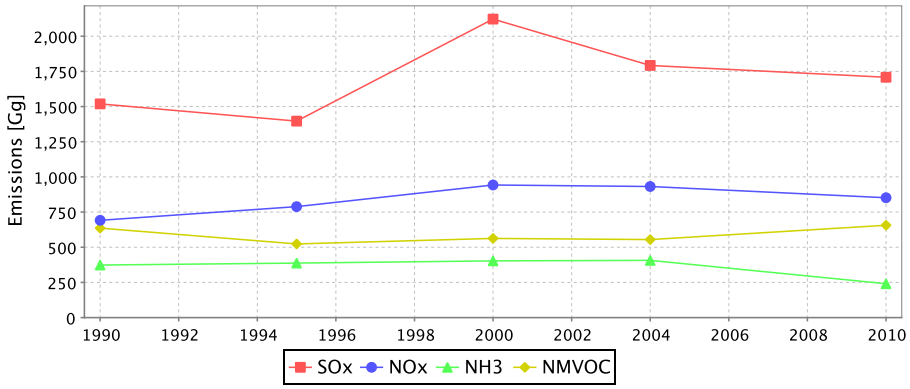

Acc. Exceedances [eq/ha/y]
500
450
400
350
300
250
200
150
100
50
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

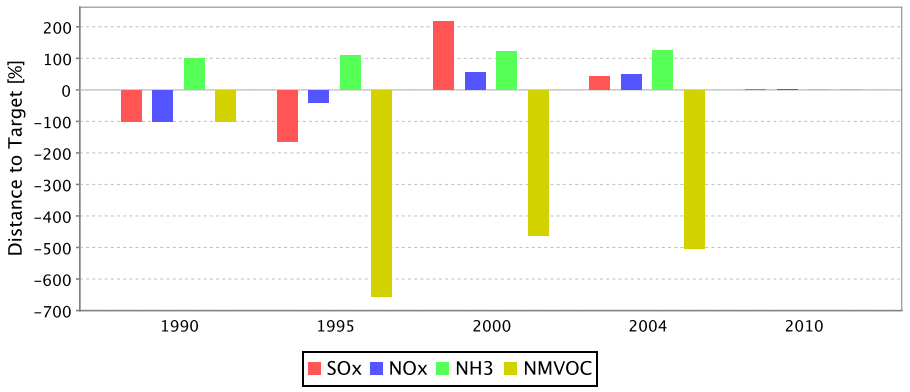

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

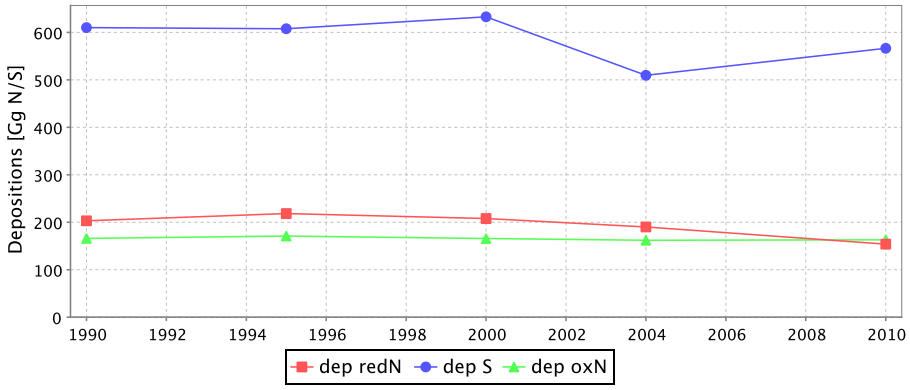

ppb.days
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

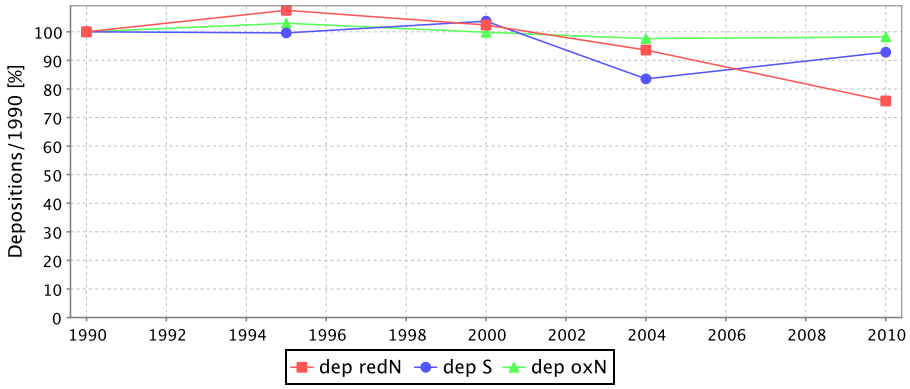

Ozone Fluxes [mmol/m²]
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

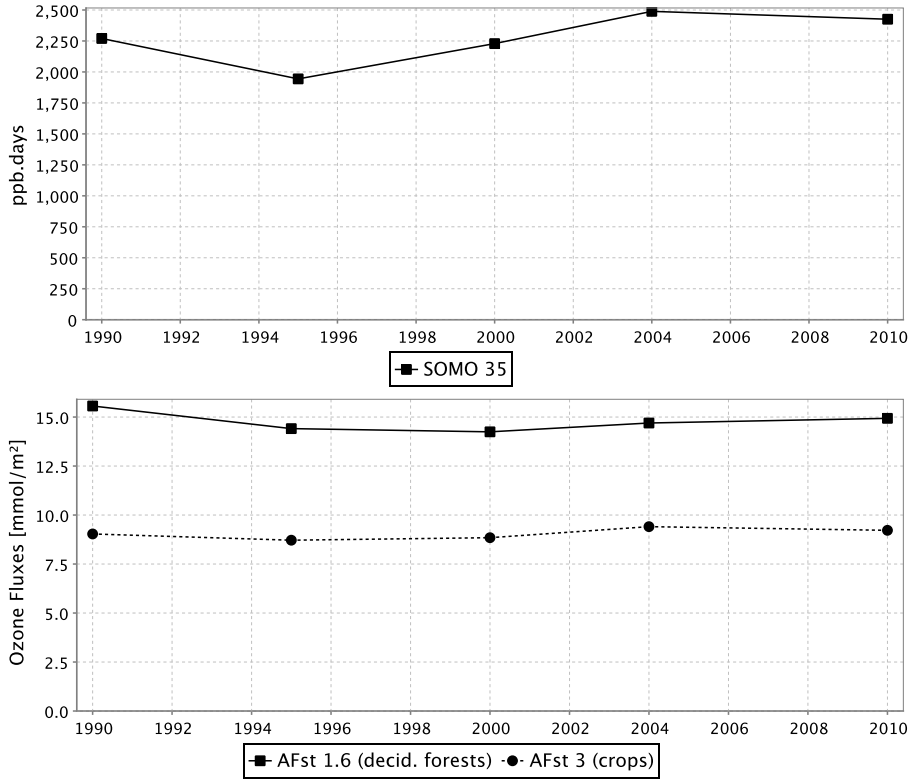
Turkey (Not included in the Gothenburg Protocol)



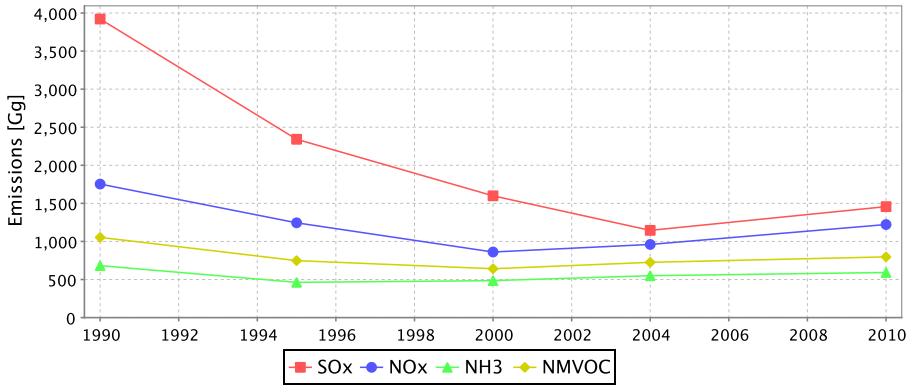


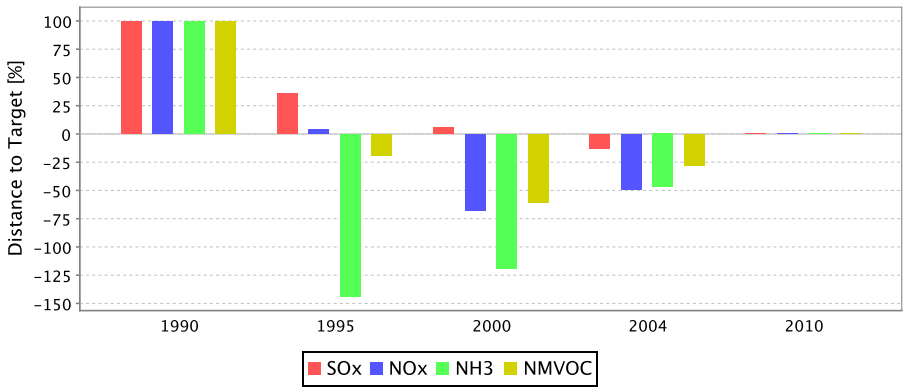


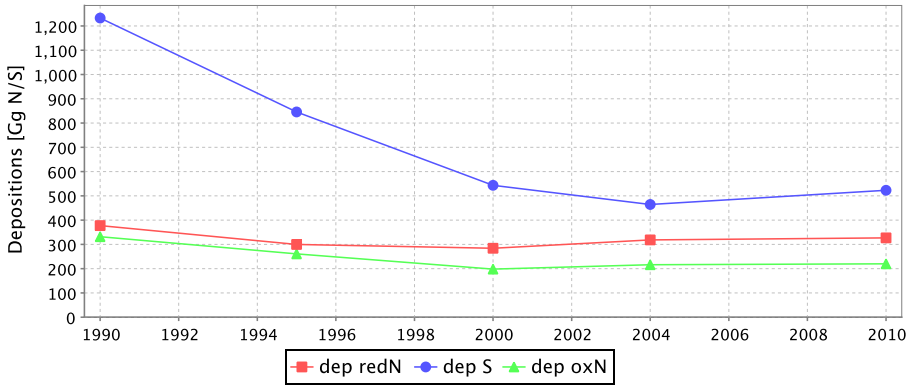


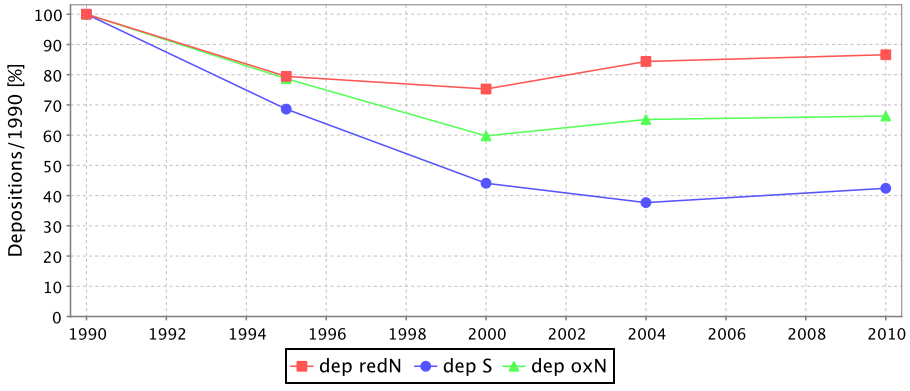

ppb.days
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35
Ozone Fluxes [mmol/m²]
15.0
12.5
10.0
7.5
5.0
2.5
0.0
AFst 1.6 (decid. forests)
AFst 3 (crops)

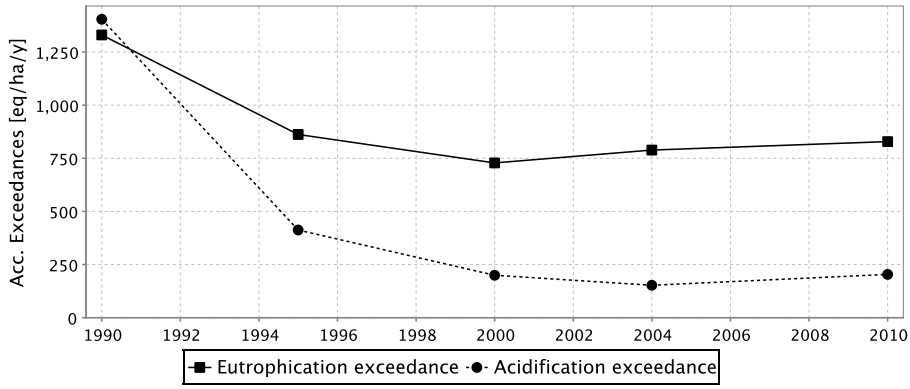
Ukraine (Non-Signatory to the Gothenburg Protocol)

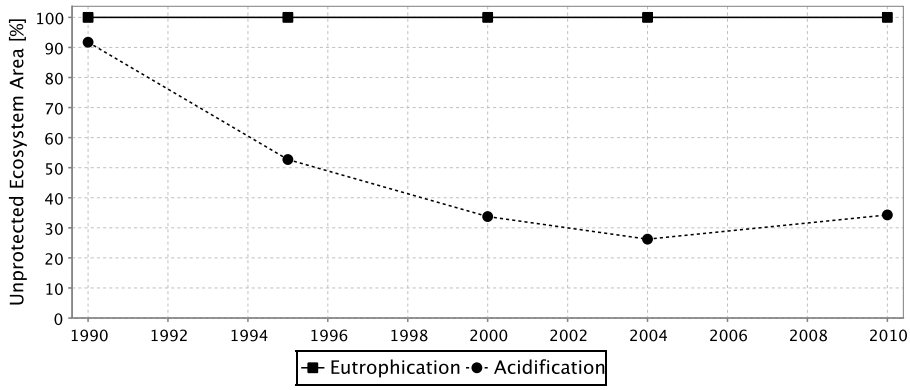


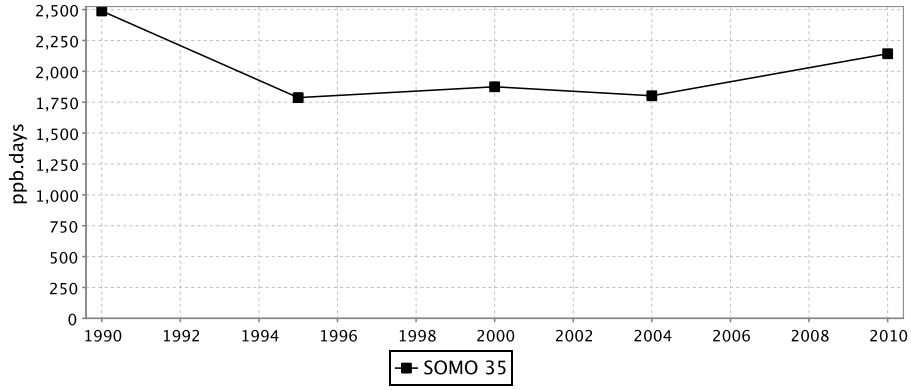


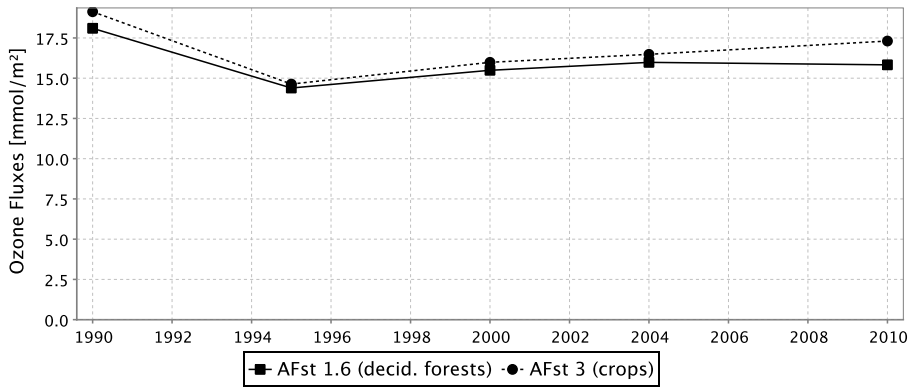




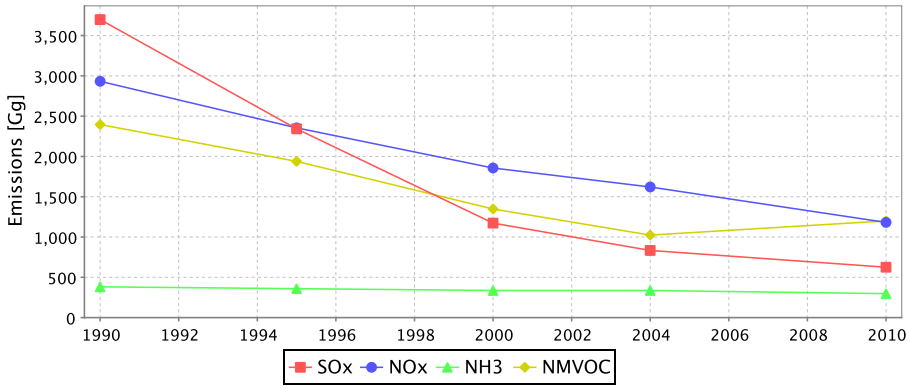

Acc. Exceedances [eq/ha/y]
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance

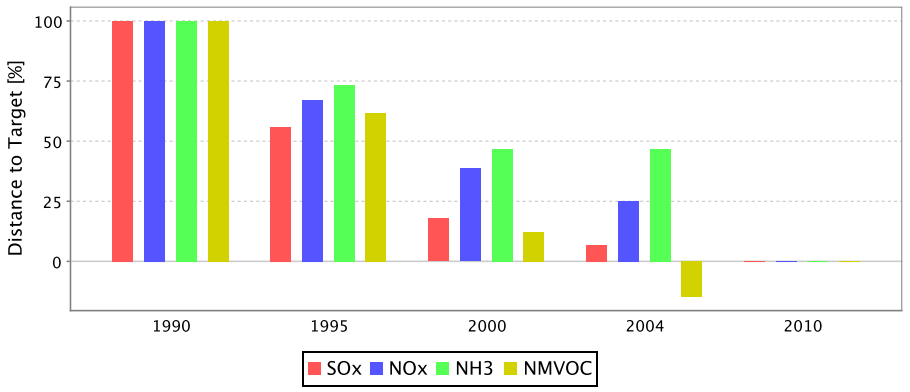

Unprotected Ecosystem Area [%]
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification

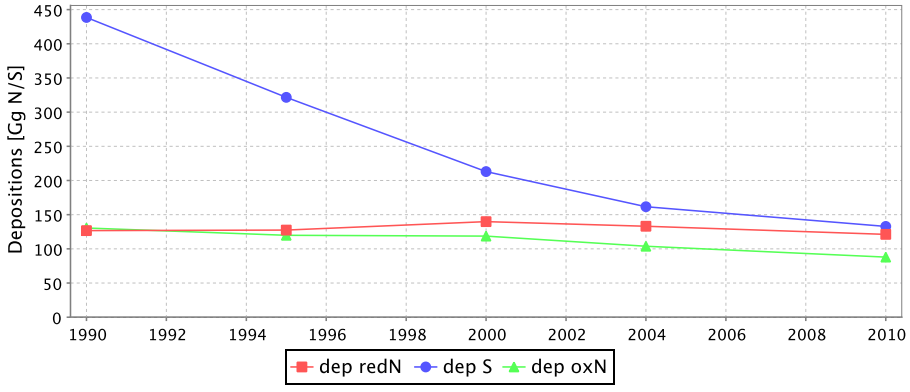

ppb.days
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35

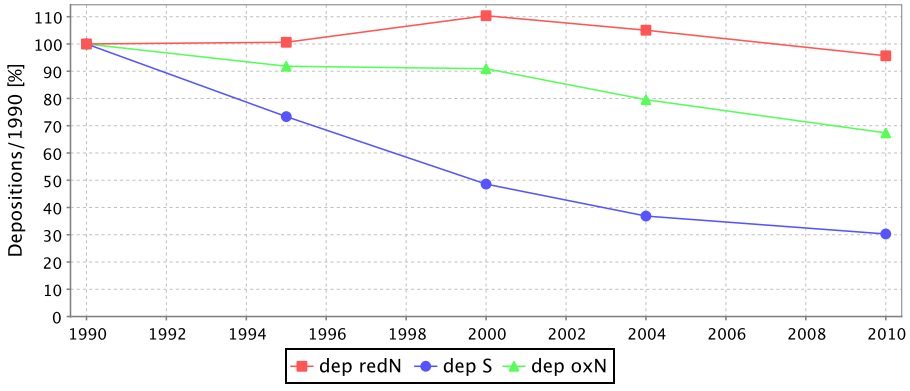

Ozone Fluxes [mmol/m²]
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)

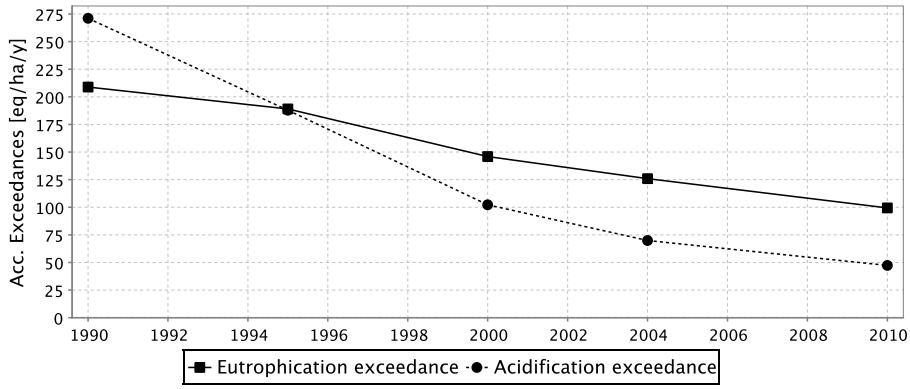
The United Kingdom (Party to the Gothenburg Protocol)

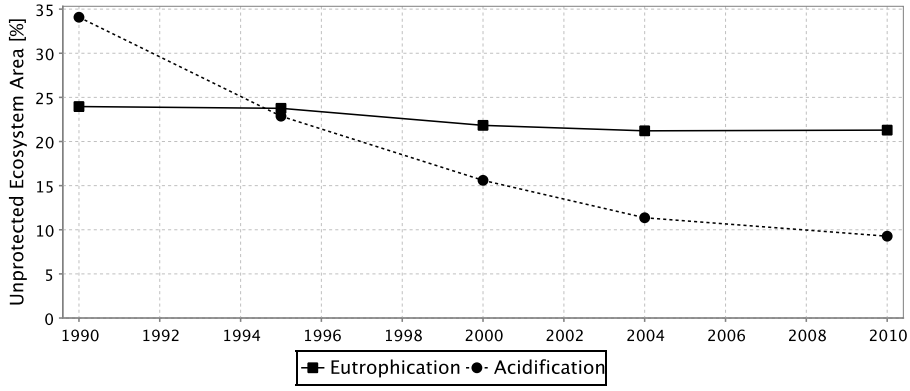


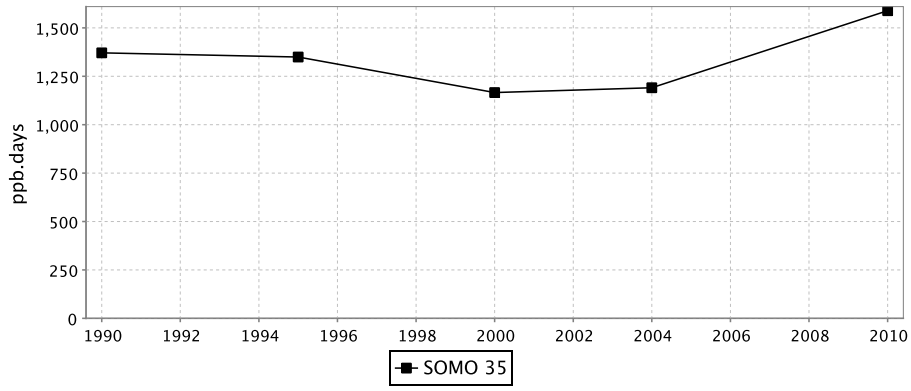


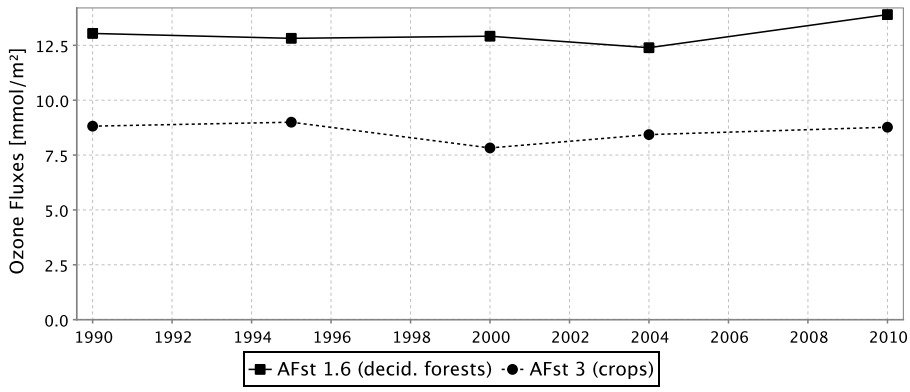





Acc. Exceedances [eq/ha/y]
275
250
225
200
175
150
125
100
75
50
25
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication exceedance
Acidification exceedance


Unprotected Ecosystem Area [%]
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Eutrophication
Acidification


ppb.days
1,500
1,250
1,000
750
500
250
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
SOMO 35


Ozone Fluxes [mmol/m²]
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
AFst 1.6 (decid. forests)
AFst 3 (crops)