APPENDIX A

VEGETATION STRUCTURE

Table A.1 Vegetation plant species characteristics in DDF at the study site

Family	Species	Common name	Abundance (no./ha)	Basal area (cm^2/ha)	RF	RDen	RDo	IVI	Relative IVI
Anacardeaceae	*Lannea coromandelica*	กุ๊ก	225	22,239	4.65	6.272	5.023	15.946	5.32
	Gluta usitata	รักใหญ่	25	15,058	2.33	0.348	3.401	6.075	2.03
	Buchanania kanzan	มะม่วงหัวแมลงวัน	25	718	4.65	0.697	0.162	5.510	1.84
	Anacardia ocidentale	มะม่วงหิมพานต์	50	1,401	2.33	0.697	0.317	3.339	1.11
Berseraceae	*Canarium subulatum*	มะกอกเกลื้อน	125	36,020	2.33	1.742	8.136	12.204	4.07
Combretaceae	*Terminalia chebula*	สมอไทย	25	4,718	2.33	0.348	1.066	3.740	1.25
Dileniaceae	*Dillenia spp.*	ส้าน	25	542	2.33	0.348	0.122	2.796	0.93
Dipterocarpaceae	*Shorea obtusa*	เต็ง	813	92,925	9.30	45.296	20.990	75.588	25.20
	Shorea siamensis	รัง	713	106,497	4.65	19.861	24.055	48.567	16.19
	Dipterocarpus obtusifolius	ยางเหียง	375	50,923	2.33	5.226	11.502	19.054	6.35
Euphorbiaceae	*Aporosa villosa*	เหมือดโลด	38	3,856	4.65	1.045	0.871	6.567	2.19
	Antidesma ghaesembilla	เม่าไข่ปลา	75	10,169	2.33	1.045	2.297	5.668	1.89
	Bridelia retusa	เต็งหนาม	50	5,341	2.33	0.697	1.206	4.229	1.41
	Croton oblongifolius	เปล้าใหญ่	25	1,720	2.33	0.348	0.388	3.062	1.02
Fabaceae	*Xylia xylocarpa*	แดง	125	14,927	6.98	5.226	3.372	15.575	5.19
	Dalbergia oliveri	ชิงชัน	50	1,833	4.65	1.394	0.414	6.459	2.15
	Pterocarpus macrocarpus	ประดู่ป่า	38	1,377	4.65	1.045	0.311	6.007	2.00
	Sindora siamensis	มะค่าแต้	25	4,210	2.33	0.348	0.951	3.625	1.21
	Dalbergia assamia	เก็ดดำ	25	21	2.33	0.348	0.005	2.679	0.89

Table A.1 (Cont')

Family	Species	Common name	Abundance (no./ha)	Basal area (cm2/ha)	RF	RDen	RDo	IVI	Relative IVI
Guttiferae	*Mammea siamensis*	สารภีเส้า	25	1,194	2.33	0.348	0.270	2.944	0.98
	Mammea harmandii	สารภีดอกใหญ่	25	877	2.33	0.348	0.198	2.872	0.96
Labiatae	*Vitex peduncularis*	กาสามปีก	63	4,104	4.65	1.742	0.927	7.320	2.44
Lecythidaceae	*Careya spharica*	กระโดน	75	3,857	2.33	1.045	0.871	4.242	1.41
Moraceae	*Artocarpus lakoocha*	มะหาด	25	6,464	2.33	0.348	1.460	4.134	1.38
Ochnaceae	*Ochna integerrima*	ช้างน้าว	25	2,076	2.33	0.348	0.469	3.143	1.05
Rubiaceae	*Vangueria catunare*	เค็ด	50	9,266	2.33	0.697	2.093	5.115	1.71
	Pavetta tomentisa	ข้าวสาร	25	1,043	2.33	0.348	0.236	2.910	0.97
	Gradenia soctepensis	คำหมอกหลวง	25	963	2.33	0.348	0.217	2.892	0.96
Sapindaceae	*Sohleichera oleosa*	ตะคร้อ	25	22,353	2.33	0.348	5.049	7.723	2.57
Teliaceae	*Grewia eriocarpa*	ปอแก่นเทา	50	11,691	2.33	0.697	2.641	5.663	1.89
UNK	UNK	UNK	75	4,339	2.33	1.045	0.980	4.351	1.45
Total			33,40	442,720	100	100	100	300	100

Table A.2 Vegetation plant species characteristics in MDF at the study site

Family	Species	Common name	Abandance (no./ha)	Basal area (cm^2/ha)	RF	RDen	Rdo	IVI	Relative IVI
Gramineae	*Thyrsostachys siamensis*	ไผ่รวก	14,613	95,609	8.33	96.89	32.42	161.88	1.80
Anacardiaceae	*Lannea coromandelica*	กุ๊ก	38	6,888	4.17	0.12	2.34	6.33	1.49
	Buchanania lanzan	มะม่วงหัวแมลงวัน	25	535	2.08	0.04	0.18	2.20	0.79
Berseraceae	*Canarium subulatum*	มะกอกเกลื้อน	50	7,851	2.08	0.08	2.66	3.33	0.74
Bignaniaceae	*Stereospermum neuranthum*	แคทราย	25	784	4.17	0.08	0.27	4.48	1.11
	Heterophragma adenophyllum	แคหางค่าง	25	5,013	2.08	0.04	1.70	2.87	1.53
Bombacaceae	*Bombax anceps*	งิ้วป่า	25	3,919	4.17	0.08	1.33	5.41	1.80
Combretaceae	*Terminalia pierrei*	ตะแบกกราย	50	7,922	2.08	0.08	2.69	3.34	3.01
	Terminaria triptera	ขี้อ้าย	25	1,165	2.08	0.04	0.40	2.30	0.94
Dipterocarpaceae	*Shorea obtusa*	เต็ง	25	733	2.08	0.04	0.25	2.23	2.28
Ebenaceae	*Diospyros castanea*	ตะโกพนม	25	2,437	2.08	0.04	0.83	2.49	0.74
Euphorbiaceae	*Croton oblongifolius*	เปล้า	25	1,408	2.08	0.04	0.48	2.33	0.76
	Bridelia tomentosa	สามพันตา	25	894	2.08	0.04	0.30	2.26	0.81
	Phyllantus emblica	มะขามป้อม	25	659	2.08	0.04	0.22	2.22	0.90
Fabaceae	*Xylia xylocarpa*	แดง	38	25,132	4.17	0.12	8.52	11.74	3.24
	Millettia brandisiang	กระพี้จั่น	58	7,137	6.25	0.29	2.42	9.71	3.21
	Bauhinia saccoclyx	เสี้ยวป่า	50	8,504	4.17	0.17	2.88	6.85	0.77
	Albezia lebbeck	พฤกษ์	75	25,208	2.08	0.12	8.55	5.94	0.96
	Dalbergia cultrata	กระพี้เขาควาย	25	3,869	4.17	0.08	1.31	5.40	3.91
	Dalbergia cultrata	เก็ดแดง	50	5,015	2.08	0.08	1.70	2.91	0.85
	Bauhinia variegata	เสี้ยวดอกขาว	25	3,887	2.08	0.04	1.32	2.70	53.96
	Pterocarpus macrocarpus	ประดู่	75	2,349	2.08	0.12	0.80	2.56	1.11
	Bauhinia glauca	เสี้ยวเครือ	50	1,823	2.08	0.08	0.62	2.44	0.73

Table A.2 (Cont')

Family	Species	Common name	Abandance (no./ha)	Basal area (cm2/ha)	RF	RDen	Rdo	IVI	Relative IVI
Guttiferae	*Gratoxylum formosum*	แต้ว	25	6,707	2.08	0.04	2.27	3.12	1.04
Lythraceae	*Lagerstroemia calyxcolata*	ตะแบกแดง	50	15,844	4.17	0.17	5.37	9.03	0.97
	Lagerstroemia loudonii	เสลา	25	1,052	2.08	0.04	0.36	2.28	0.75
Myrtaceae	*Syzygium cumini*	หว้า	25	1,560	2.08	0.04	0.53	2.36	0.92
Rutaceae	*Xanthophyllum lanceatum*	ส่องฟ้า	75	4,232	2.08	0.12	1.44	2.83	0.78
	Atalantia monopylla	มะนาวป่า	25	4,210	2.08	0.04	1.43	2.75	0.88
Sapindaceae	*Schleichera oleosa*	ตะคร้อ	50	16,631	2.08	0.08	5.64	4.63	0.83
	Arfeuilea arborescens	หมากเล็ก หมากน้อย	25	645	2.08	0.04	0.22	2.22	0.74
Teliaece	*Grewia eriocarpa*	ปอแก่นเทา	150	15,215	2.08	0.25	5.16	4.59	1.54
Vitigaceae	*Vitex peduncularis*	กาสามปีก	50	7,076	6.25	0.25	2.40	9.64	2.11
	Vitex canescens	ผ่าเสี้ยน	75	2,952	2.08	0.12	1.00	2.64	1.98
Total			16,021	294,867	100	100	100	300	100

Table A.3 The estimation of aboveground biomass in pole stage of DDF DDF1, DDF2, DDF3 and DDF4

Plot no.	Tree density (no./ha)	Mass (ton/ha)			Total AGB (ton/ha)	Carbon content (ton/ha)
		Stem	Branch	Leaf		
DDF1	2,650	165.66	18.76	0.51	184.93	92.47
DDF2	2,100	138.71	15.46	0.40	154.57	77.29
DDF3	1,275	64.26	6.95	0.27	71.48	35.74
DDF4	1,200	55.71	5.99	0.24	61.94	30.97

Table A.4 The estimation of aboveground biomass in sapling stage of DDF1, DDF2, DDF3 and DDF4

Plot no.	Sapling stage density (no./ha)	Mass (ton/ha)			Total AGB (ton/ha)	Carbon content (ton/ha)
		Stem	Branch	Leaf		
DDF1	1,400	3.29	0.34	0.11	3.74	1.87
DDF2	475	0.50	0.05	0.01	0.56	0.28
DDF3	900	0.60	0.59	0.02	1.21	0.61
DDF4	750	0.85	0.08	0.03	0.96	0.48

Table A.5 The estimation of aboveground biomass in pole stage of MDF1, MDF2, MDF3 and MDF4

Plot no.	Tree density (no./ha)	Bamboo density (no./ha)	Mass (ton/ha)				Total AGB (ton/ha)	Carbon content (ton/ha)
			Stem	Branch	Leaf	Bamboo		
MDF1	725	2,600	102.63	11.33	0.08	877.33	991.37	495.69
MDF2	300	1,125	24.40	2.72	0.04	2,440.40	2,467.56	1,233.78
MDF3	375	950	15.18	1.77	0.05	4,110.86	4,127.86	2,063.93
MDF4	575	1,350	38.72	4.27	0.08	1,732.58	1,775.65	887.83

Table A.6 The estimation of aboveground biomass in sapling stage of MDF1, MDF2, MDF3 and MDF4

Plot no.	Sapling stage (no./ha)	Mass (ton/ha)			Total AGB (ton/ha)	Carbon content (ton/ha)
		Stem	Branch	Leaf		
MDF1	150	0.40	0.04	0.01	0.47	0.23
MDF2	600	0.63	0.06	0.02	0.71	0.36
MDF3	450	0.63	0.06	0.02	0.71	0.36
MDF4	ND	ND	ND	ND	ND	ND

Table A.7 The estimation of aboveground biomass and carbon contents in seedling stage and biomass fuel of DDF and MDF plot number 1-4

Plot no.	Seedling mass (ton/ha)	Biomass fuel mass (ton/ha)	Total AGB (ton/ha)	Carbon content (ton/ha)
DDF1	0.008	0.093	0.101	0.050
DDF2	0.003	0.099	0.102	0.051
DDF3	0.004	0.079	0.083	0.042
DDF4	0.007	0.059	0.066	0.033
MDF1	0.003	0.150	0.153	0.077
MDF2	0.002	0.185	0.187	0.094
MDF3	0.002	0.133	0.135	0.068
MDF4	0.002	0.209	0.211	0.106

Figure A.1 Experimental plot set up for vegetation estimation in DDF plots

Figure A.2 The unknown species in DDF plots

Figure A.3 Experimental plot set up for vegetation estimation in MDF plots

Figure A.4 Biomass fuel sampling subplot of in 1m × 1m in the left corner of main plot (40m × 40m) during rainy season

Figure A.5 The undergrowth (climbers and herb) samples in DDF plots

Figure A.6 The undergrowth (climbers and herb) samples in MDF plots

APPENDIX B

CHEMICAL COMPOSITION OF BIOMASS FUELS AND A MIXTURE OF ASH AND CHARRED LEAVES

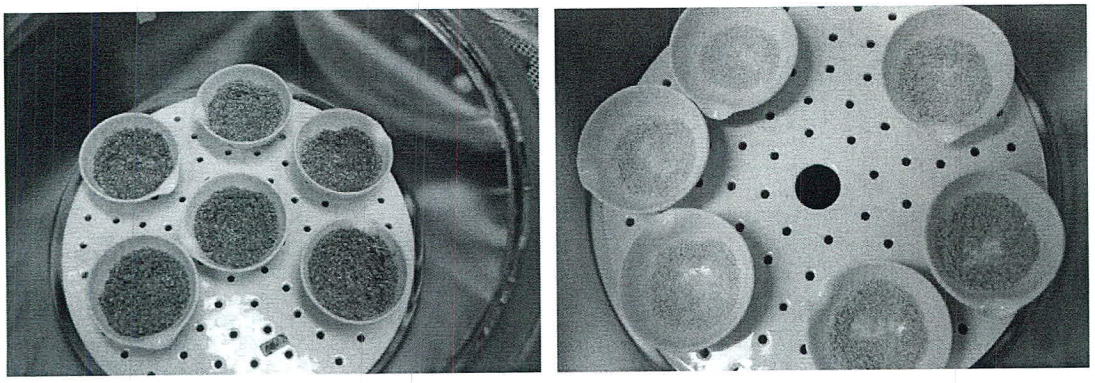


Figure B.1 Estimation of ash in biomass fuels by USEPA E1755-01 method

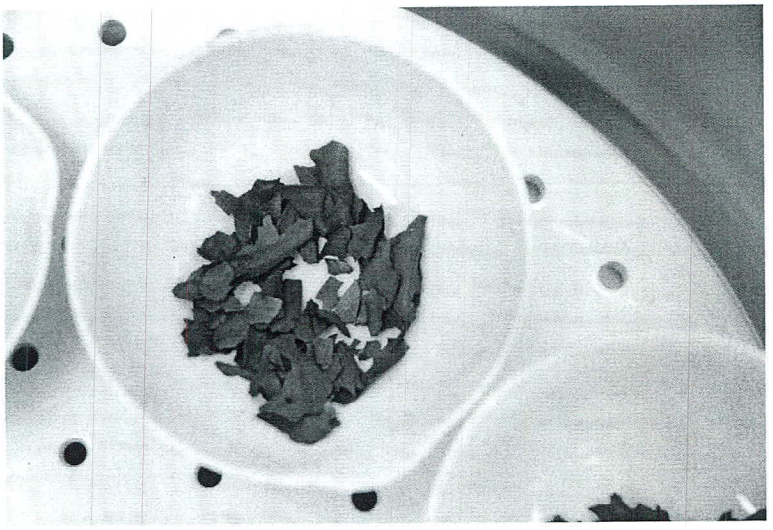


Figure B.2 Ash and charred leaves sampling from DDF plots

Figure B.3 Ash and charred leaves sampling from MDF plots

Table B.1 Specifications of the OEA analyzer

Subject	Specification
Sample requirements	3-5 mg weight contained in tin capsule Sample storage: store room temperature
Analysis time	1,200 sec (20 min)
Analysis temperature	900 °C
Detection limit	1%
Carrier gas/flow rate	Helium measurement: 140 mL/min
	Helium references: 100 mL/min
	Oxygen: 250 mL/min
Oxygen injection time	5 sec
Standard type and elemental composition	BBOT; 2,5 Bis (5-tert-butyl-benzol-2-yl) thiophene 6.54%Nitrogen, 72.59%Carbon, 6.06% Hydrogen, 7.43% Sulfur and 7.42% Oxygen.

Appendix B.1

A sample will be combusted in the reactor quartz tube in which copper oxide and reduced copper are contained. After combustion, the gases produced are carried by a helium flow to a layer filled with copper, then swept through a GC column that provided the separation of the combustion gases and finally detected by a thermal conductivity detector.

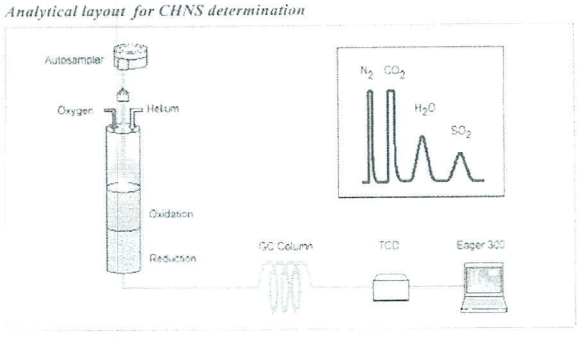


Figure B.4 Diagram of carbon, hydrogen, nitrogen, and sulfur analysis using OEA analyzer

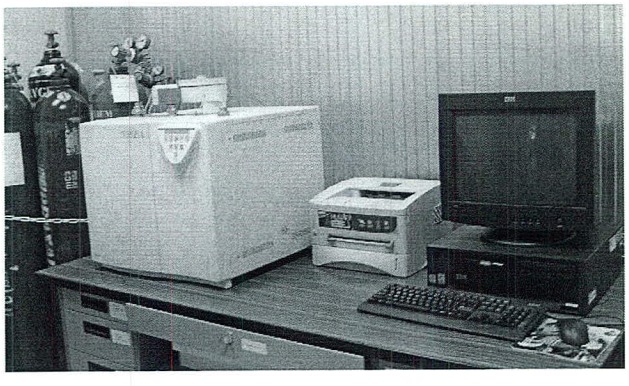


Figure B.5 OEA analyzer FlashEA1112 (Thermo Finnigan, Italy) instrumental configuration used for carbon content analysis in PM emitted from biomass burning.

The quantitation of the element that has been analyzed (e.g. carbon) is determined by comparing the values obtained from the analysis of the sample with the analysis of a suitable standard and the use of a reference factor known as K-factor. Such a factor is defined in the following equation below:

$$K_C = \frac{AreaStd_C - AreaBlk_C}{(\%Tstd_C * Wstd)/100} \qquad \text{Equation 5.1}$$

Calculation of the percentage of the element (%) which is given by the following equation:

$$\%C_{Unk} = \frac{(AreaUnk - AreaBlk)/K}{Wunk} * 100 \qquad \text{Equation 5.2}$$

where: K is the average K-factor, *Wunk* and *Wstd* are the weight of unknown and standard, *%Tstd* is the theoretical percentage of standard that was used BBOT (2,5 Bis (5-tert-butyl-benzol-2-yl) thiophene), *AreaUnk AreaBlk* and *AreaStd* are the peak area or integral of the unknown, blank and standard, respectively.

Table B.2 Microwave digestion conditions for biomass fuel and residues after burned.

Step	Power	Ramp (min)	Hold (min)	Fan
1	1200	10:00	10:00	1
2	0	00:00	20:00	2

Appendix B.2

The method for digesting these samples is based on the research of Cohen (Cohen, 2004). The solutions were brought up to 20 mL in deionized water. The supernatant extract solution was dilute about 20 to 100 times in the another container before being measured by Inductively Coupled Plasma Mass Spectrometry (ICPMS 7500a, Agilent USA). The standard solution of this study used the multi-element calibration standard -2A (Part 8500-6940, Agilent) CAS # HNO_3 [7697-37-2] that composed of 10μg/mL Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs. Cu, Fe, Ga, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V and Zn.

For the TPM samples, preparation for the ICP-MS analysis was applied from the compendium method IO-3 (William et al., 1999). This method is designed to determine the metal in the ambient air using ICP-MS. The metals of this method which are for recommended to analysis are Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Mo, Ni, Se, Ag, Tl, Th, U, V, Zn, Bi, In, Sc, Tb and Y. The total particulate matter collected on quartz filters were cut, a half filter was contained in a mixture of 10 mL 3%HNO_3/8%HCl and placed in a plastic tube centrifuge and then centrifuged at 10,000 rpm for 30 min using Multispeed centrifuge (Multispeed centrifuge PK 131, ALC International Srl, made in EU). After extraction, the particulate matter solution was measured for the trace element component by ICP-MS.

APPENDIX C

FIELD EQUIPMENT SET-UP AND PRESCRIBED FIRE

Figure C.1 Comparison between rainy season and dry season of DDF at the study site

Figure C.2 Comparison between rainy season and dry season of MDF at the study site

Figure C.3 Comparison between rainy season and dry season of MDF at the study site

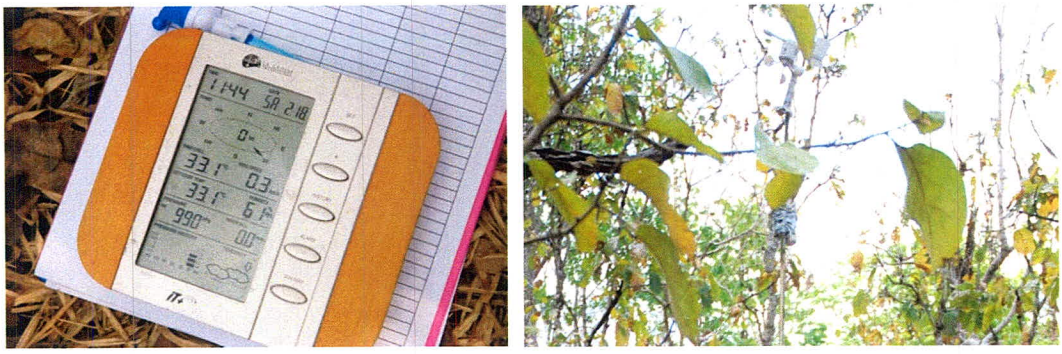


Figure C.4 Meteorological set up in the field at the top of tower height 3 m

Figure C.5 Field equipment set up for emission pollutant sampling from prescribed fires

Figure C.6 Field equipment set up in the box at the top of tower height 3 m

Figure C.7 Fire break in radius of the main plot

Figure C.8 Prescribed fires in DDF plots

Figure C.9 Prescribed fires in MDF plots

Figure C.10 Emission sampling in smoke plume during prescribed buring in DDF and MDF plots

Table C.1 The weather condition recording in prescribed experiment of DDF1 (March 3, 2011)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
12.45	NE	0.2	34.3	54	992
12.50	NE	0.3	34.3	53	990
12.55	NE	0.3	34.5	52	990
12.59	WNW	0.0	34.5	52	990
13.04	NNE	0.2	34.4	52	991
13.09	NNE	0.0	34.3	53	991
13.14	WNW	5.0	34.6	52	992
13.19	WNW	0.0	34.8	52	990
13.24	SSE	0.0	34.8	51	990
13.29	SSW	1.8	35.3	50	990
13.34	SSW	0.9	35.9	49	990
13.39	WNW	1.4	37.0	47	990
13.44	WNW	3.9	37.3	45	989
13.49	NE	0.2	36.9	46	989
13.54	WNW	0.3	36.6	47	989
13.59	NW	0.5	36.3	48	990
14.04	WNW	0.3	35.8	48	990
14.09	WNW	0.3	35.4	48	990
14.14	NW	0.4	35.4	49	989
14.19	SE	0.7	35.0	49	990
14.24	NW	0.7	35	49	989
14.29	NW				
14.34	SW				
14.39	SW				
14.44	SW				
Background		0.75	34.46	52.50	990.75
Emission		0.98	35.58	49.12	989.94

Table C.2 The weather condition recording in prescribed experiment of DDF3 (February 25, 2012)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
11.47	SSW	1.0	35.4	49.0	987
11.52	SSE	0.7	36.1	48.0	987
11.57	SE	0.7	37.0	46.0	988
12.02	ENE	1.8	37.5	44.0	987
12.07	SSE	0.7	37.9	44.0	987
12.12	NE	1.0	38.2	43.0	987
12.17	ENE	1.8	38.2	43.0	987
12.22	ESE	0.7	39.2	43.0	987
12.27	ESE	1.4	39.9	42.0	987
12.32	E	3.9	40.1	41.0	987
12.37	E	1.8	39.8	41.0	987
12.42	E	2.1	39.3	41.0	987
12.47	ENE	3.9	39.5	41.0	987
12.52	ENE	2.8	39.5	41.0	987
12.57	E	3.2	38.2	42.0	987
13.02	E	2.8	38.0	42.0	987
13.07	NW	0.7	38.0	44.0	987
13.12	ESE	3.6	37.7	44.0	987
13.17	E	0.3	37.5	44.0	987
13.22	SSE	2.1	37.5	45.0	987
13.27	ESE	0.0	35.0	45.0	987
13.32	ESE	0.2	35.0	45.0	984
13.37	E	0.1	35.0	46.0	984
13.42	E	0.0	35.0	46.0	986
Background		1.05	37.44	45.00	987.13
Emission		1.81	37.81	43.13	986.56

Table C.3 The weather condition recording in prescribed experiment of DDF4 (February 25, 2011)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
15.45	NNE	0.3	32.0	49.0	988
15.50	NE	1.0	36.1	48.0	988
15.55	NE	1.0	37.0	48.0	988
16.03	NNE	0.9	37.5	48.0	988
16.08	NW	1.6	37.9	47.0	987
16.13	NNE	0.7	38.2	45.0	987
16.18	NW	1.4	38.2	45.0	988
16.23	NE	0.4	39.2	45.0	987
16.28	NE	1.8	39.9	44.0	988
16.33	E	2.0	40.1	44.0	988
16.38	ENE	2.0	39.8	43.0	988
16.43	E	1.2	39.3	43.0	988
16.48	ENE	3.3	39.5	43.0	987
16.53	ENE	2.1	39.5	41.0	988
16.58	E	2.6	38.8	41.0	987
17.03	ENE	2.1	37.4	42.0	987
17.08	ESE	1.0	37.0	42.0	987
17.13	E	3.0	37.0	42.0	988
17.18	E	1.0	37.0	43.0	988
17.23	ENE	1.0	36.0	44.0	988
17.28	ENE	0.8	36.6	44.0	988
17.33	ENE	0.4	36.4	44.0	988
17.38	E	0.2	36.0	45.0	988
17.43	ENE	0.0	35.0	45.0	985
Background		0.91	37.01	46.88	987.63
Emission		1.40	37.92	43.81	987.52

Table C.4 The weather condition recording in prescribed experiment of MDF1 (March 3, 2011)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
15.15	NW	0.0	33.5	54	988
15.20	NW	0.3	33.5	54	989
15.25	WNW	0.7	34.0	54	989
15.30	NE	0.2	34.3	54	989
15.35	NE	0.6	34.1	53	988
15.40	WNW	1.2	34.5	52	988
15.45	NW	3.0	34.5	52	988
15.50	NNW	2.0	35.6	52	988
15.55	NW	1.0	36.0	50	988
16.00	E	2.2	37.0	49	988
16.05	SE	0.4	37.0	47	988
16.10	SE	1.0	37.0	46	988
16.15	NW	0.8	37.3	46	988
16.20	NNW	3.2	36.8	46	988
16.25	WNW	3.0	36.6	47	988
16.30	WNW	1.1	36.3	47	988
16.35	NW	2.0	35.0	46	988
16.40	SW	0.4	35.0	47	989
16.45	SW	0.2	34.7	48	989
16.50	WNW	0.3	34.0	48	988
16.55	WNW	0.3	34.0	48	988
17.00	WNW	0	33.6	48	988
Background		0.15	33.50	54.00	988.50
Emission		1.19	35.73	47.67	988.13

Table C.5 The weather condition recording in prescribed experiment of MDF2 (February 18, 2012)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
14.00	E	0.0	33.6	51	989
14.05	SE	0.0	33.6	52	989
14.10	SE	0.0	33.6	51	989
14.15	SE	0.0	33.8	51	989
14.20	NNE	0.0	33.6	51	989
14.25	E	2.0	33.6	52	989
14.30	NNE	3.9	33.8	51	989
14.35	NNE	2.1	33.8	51	989
14.40	NE	0.0	33.6	51	989
14.45	NE	0.0	33.5	51	989
14.50	NNE	0.0	33.1	53	989
14.55	NNE	0.7	32.9	53	989
15.00	NNE	0.0	32.9	53	988
15.05	NNE	0.3	35.4	50	989
15.10	NNE	0.0	36.6	47	988
15.15	NE	1.0	36.4	47	988
15.20	ENE	0.0	34.8	50	989
15.25	ENE	0.0	34.6	50	988
15.30	E	0.0	34.3	51	988
15.35	E	0.0	33.9	53	989
15.40	SSE	0.3	33.9	53	989
15.45	E	0.0	33.1	52	989
15.50	E	0.0	33.1	52	989
15.55	N	0.0	32.3	53	988
16.00	NE	0.0	32.3	53	989
16.05	NE	0.0	32.0	53	989
Background		0.00	33.64	51.20	989.00
Emission		0.47	33.80	51.36	988.73

Table C.6 The weather condition recording in prescribed experiment of MDF3 (February 3, 2011)

time	wind direction	wind speed (km/hr)	outdoor temp (°C)	humidity (RH%)	Pressure (hPa)
12.30	E	0.6	32.0	49.0	987
12.35	NNE	0.9	36.1	48.0	987
12.40	ENE	0.7	37.0	46.0	988
12.45	E	2.0	37.5	44.0	987
12.50	NNE	1.0	37.9	44.0	987
12.55	N	0.4	38.2	43.0	987
13.00	NNE	2.2	36.1	48.0	987
13.05	NNE	0.3	37.0	46.0	987
13.10	N	1.0	37.5	44.0	987
13.15	E	1.6	37.9	44.0	987
13.20	ENE	3.4	38.2	43.0	987
13.25	E	1.6	38.2	43.0	987
13.30	NNE	2.8	39.2	43.0	987
13.35	E	1.0	39.9	42.0	987
13.40	ESE	2.0	40.1	41.0	987
13.45	ESE	1.9	39.8	41.0	987
13.50	E	0.6	39.3	41.0	987
13.55	E	2.8	39.5	41.0	987
14.00	ESE	2.0	38.0	41.0	987
14.05	NNE	0.6	38.0	42.0	987
14.10	NNE	0.4	37.4	42.0	987
14.15	NNE	0.0	37.5	42.0	988
14.20	E	0.0	37.5	44.0	988
14.25	ENE	0.2	38.0	44.0	987
14.30	SE	0.3	37.0	45.0	987
14.35	SE	0.0	37.0	45.0	987
14.40	ENE	0.0	36.0	45.0	988
14.45	ENE	0.0	36.0	45.0	987
14.50	NE	0.0	35.6	45.0	987
14.55	ENE	0.0	35.5	45.0	987
15.00	NE	0.0	35.0	45.0	987
15.05	NE	0.0	35.0	44.6	987
Emission		0.95	37.55	43.52	987.12

Table C.7 The fire propagation in prescribed experiment of DDF1 (March 3, 2011)

time	fire heading (m)	flame height (m)
13.04	0	
	5	60
13.15	10	60
13.19	15	50
13.22	20	40
13.34	25	50
13.40	30	30
13.48	35	30
13.55	40	30
14.29	burned all plot	

51 0.78 m/min fire front

Table C.8 The fire propagation in prescribed experiment of DDF3 (February 25, 2012)

time	fire heading (m)	flame height (m)
12.26	0	
	5	40
	10	20
12.40	15	20
12.43	20	30
12.45	25	40
13.07	30	60
	35	20
13.26	40	20
13.33	burned all plot	

60 0.67 m/min fire front

Table C.9 The fire propagation in prescribed experiment of DDF4 (February 25, 2011)

time	fire heading (m)	flame height (m)
16.03	0	
16.06	5	25
16.11	10	35
16.22	15	25
16.31	20	10
16.43	25	20
	30	10
	35	
17.02	40	
17.30	burned ended	20.83

59 0.68 m/min fire front

Table C.10 The fire propagation in prescribed experiment of MDF1 (March 3, 2011)

time	fire heading (m)	flame height (m)
15.50	0	
15.57	5	50
16.05	10	40
16.11	15	40
16.18	20	50
16.26	25	30
16.32	30	20
16.38	35	20
16.45	40	30
16.56	burned all plot	

55 0.73 m/min fire front

Table C.11 The fire propagation in prescribed experiment of MDF2 (February 18, 2012)

time	fire heading (m)	flame height (m)
14.20	0	
14.23	5	50
14.26	10	30
14.29	15	30
14.39	20	40
14.42	25	40
14.50	30	40
14.57	35	50
15.05	40	30
15.36	burned all plot	

45 0.89 m/min fire front

Table C.12 The fire propagation in prescribed experiment of MDF3 (February 3, 2011)

time	fire heading (m)	flame height (m)
13.00	0	
13.03	5	30
13.06	10	30
13.14	15	20
13.23	20	40
13.32	25	30
13.40	30	30
13.47	35	20
13.50	40	20
14.18	burned all plot	

50 0.80 m/min fire front

APPENDIX C

FIELD EQUIPMENT SET-UP AND PRESCRIBED FIRE

APPENDIX D

EMISSION FACTORS

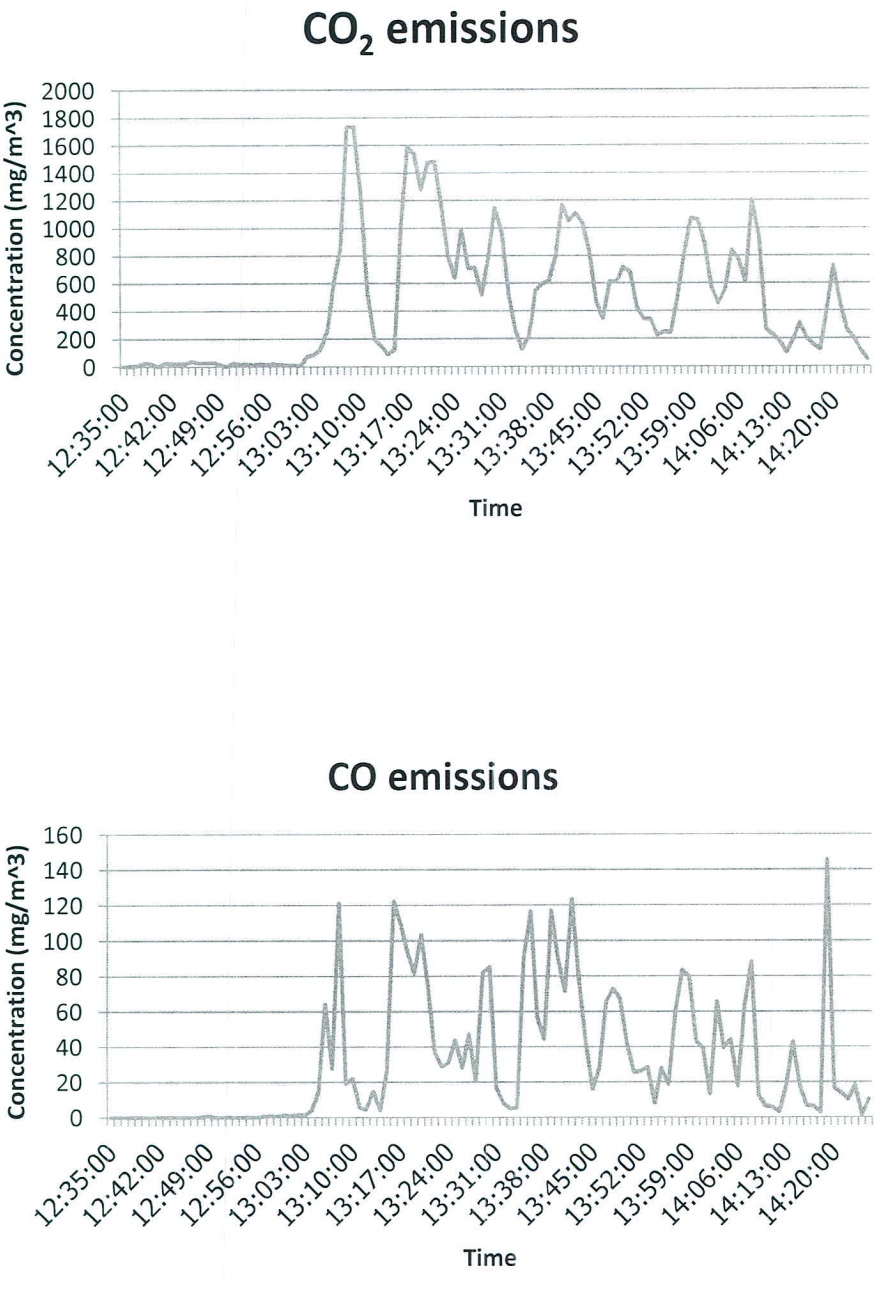


Figure D.1 Emission concentrations of CO_2 and CO from prescribed fire in DDF1

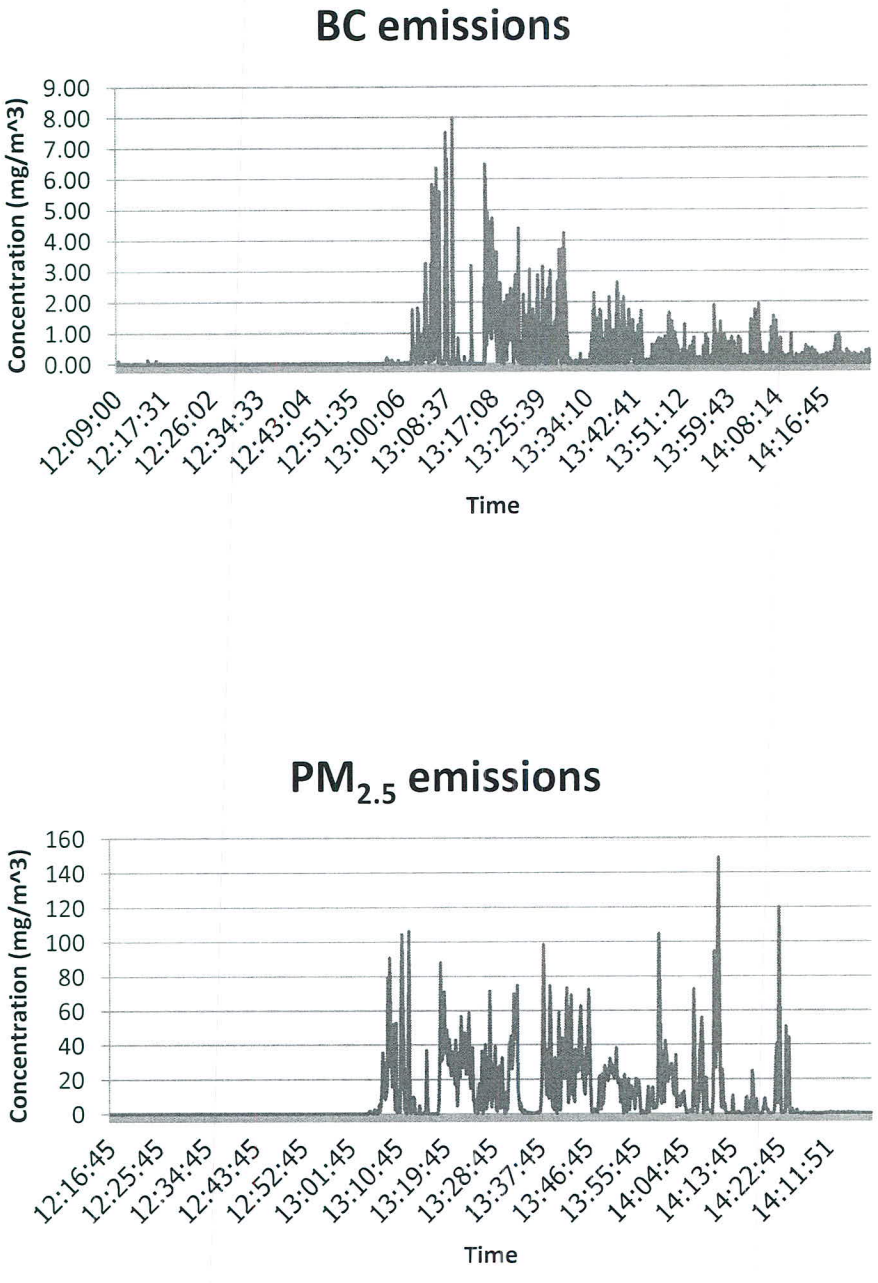
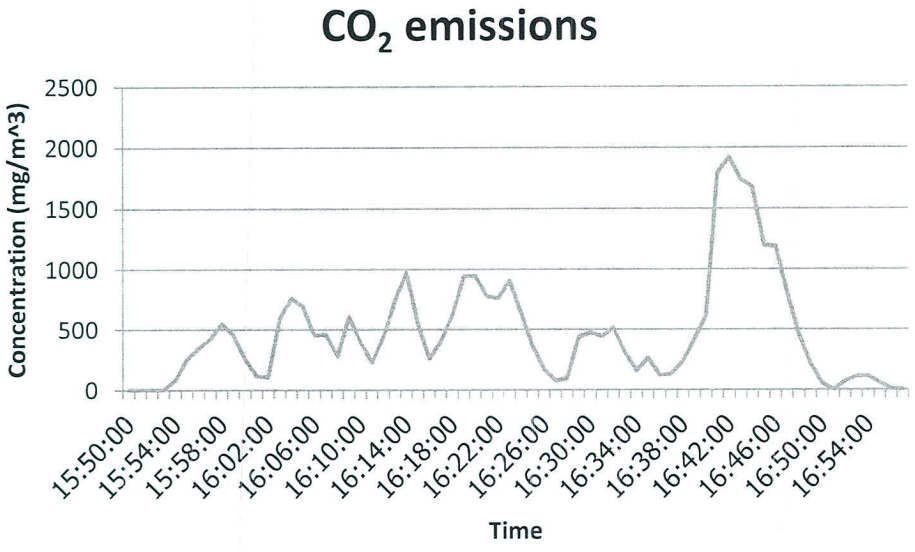


Figure D.2 Emission concentrations of BC and $PM_{2.5}$ from prescribed fire in DDF1



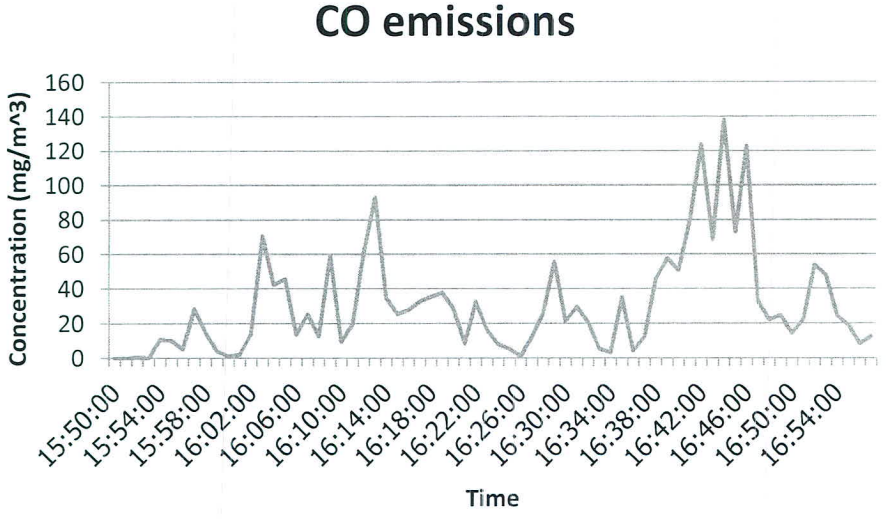
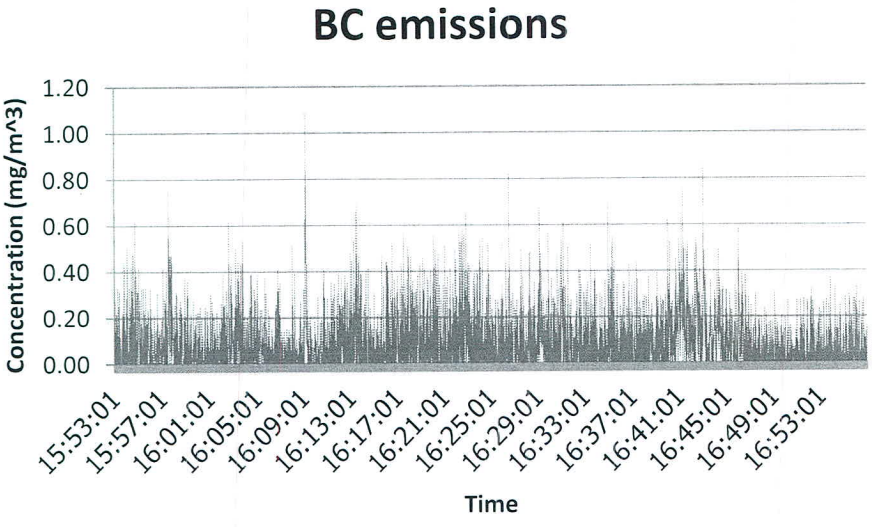


Figure D.3 Emission concentrations of CO_2 and CO from prescribed fire in MDF1



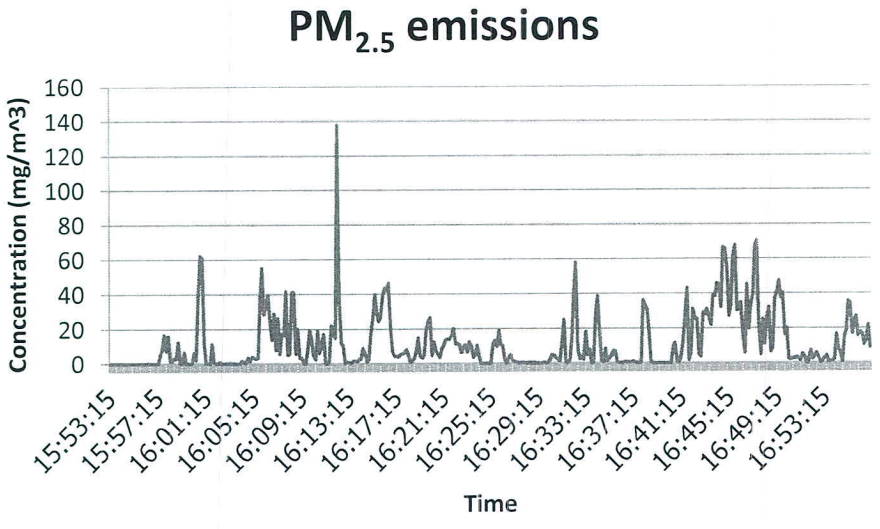
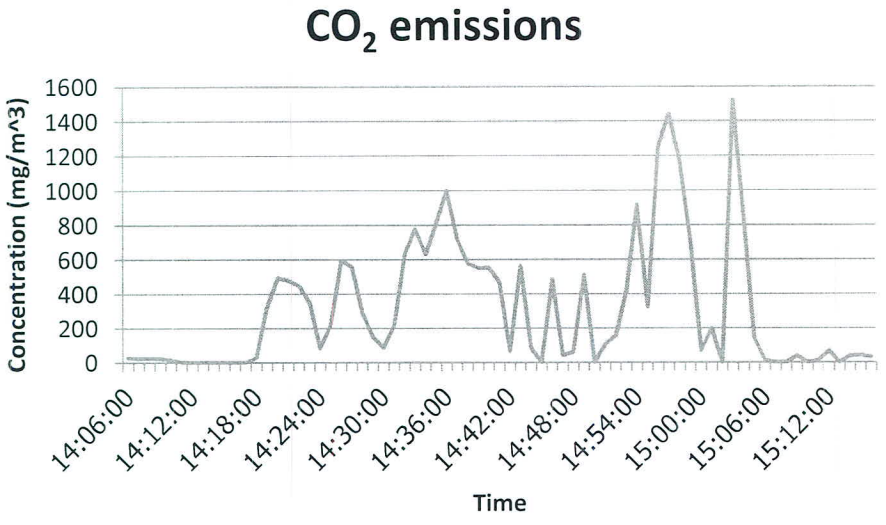


Figure D.4 Emission concentrations of BC and $PM_{2.5}$ from prescribed fire in MDF1



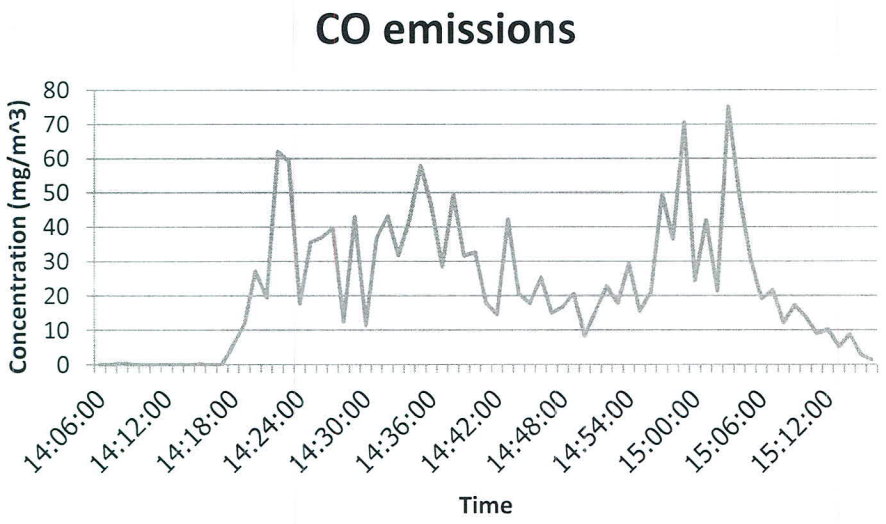
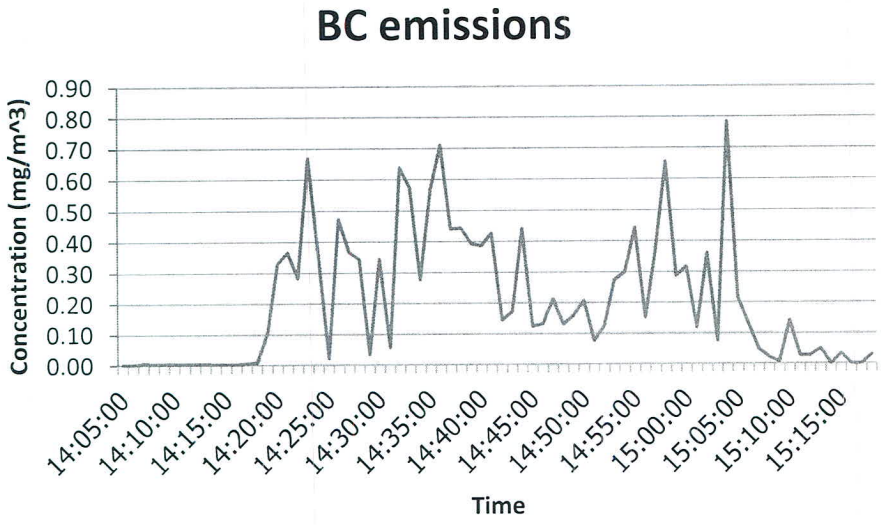


Figure D.5 Emission concentrations of CO_2 and CO from prescribed fire in MDF2



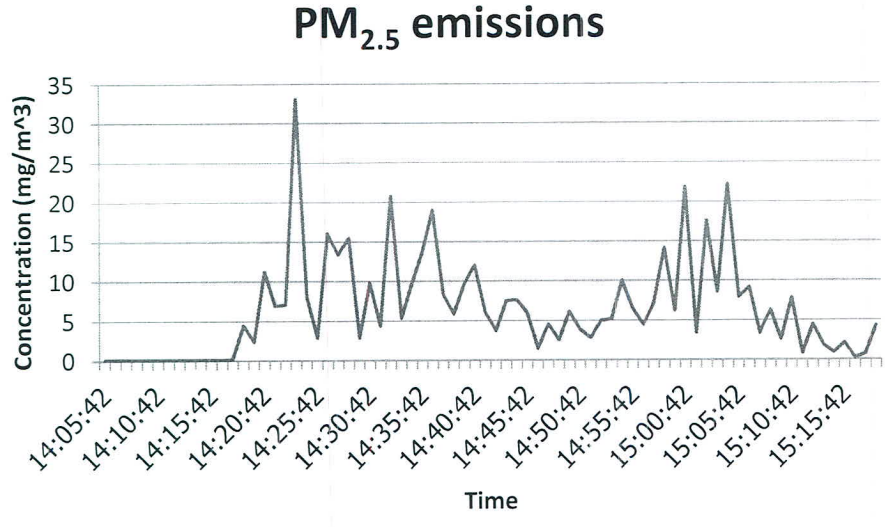
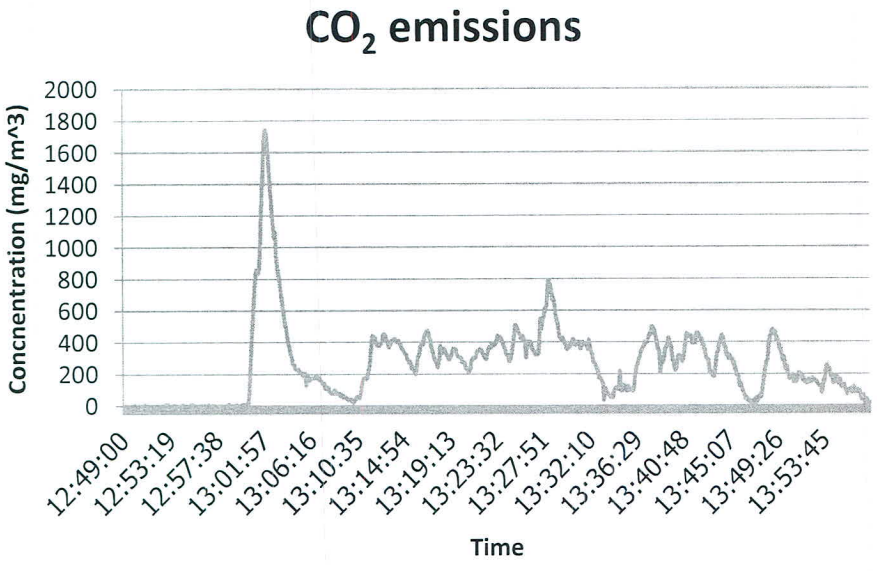


Figure D.6 Emission concentrations of BC and $PM_{2.5}$ from prescribed fire in MDF2



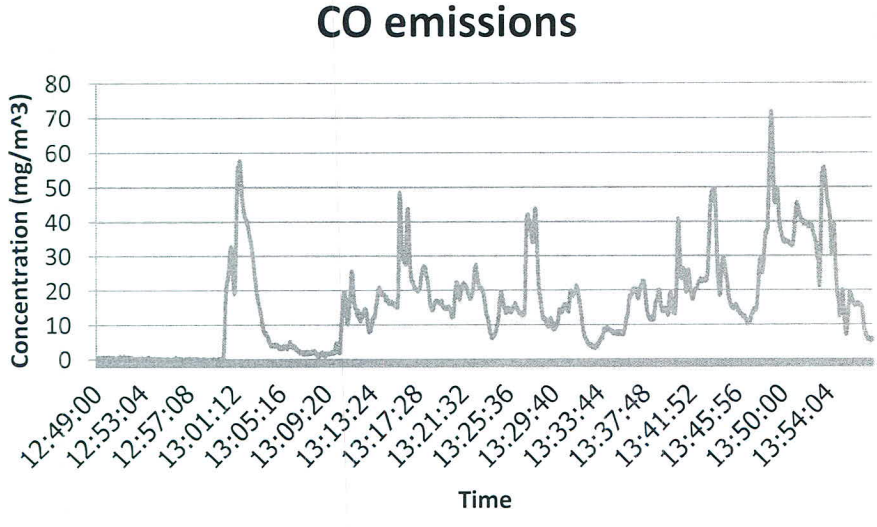
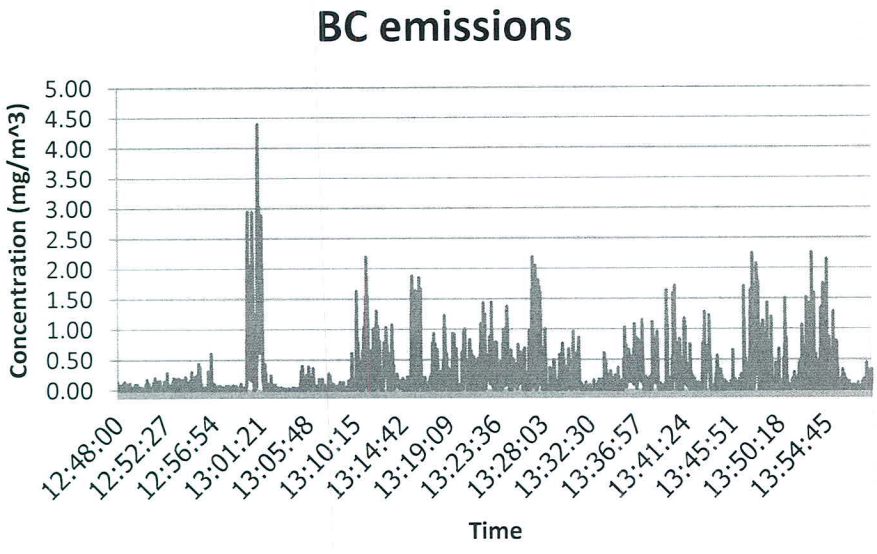


Figure D.7 Emission concentrations of CO_2 and CO from prescribed fire in MDF3



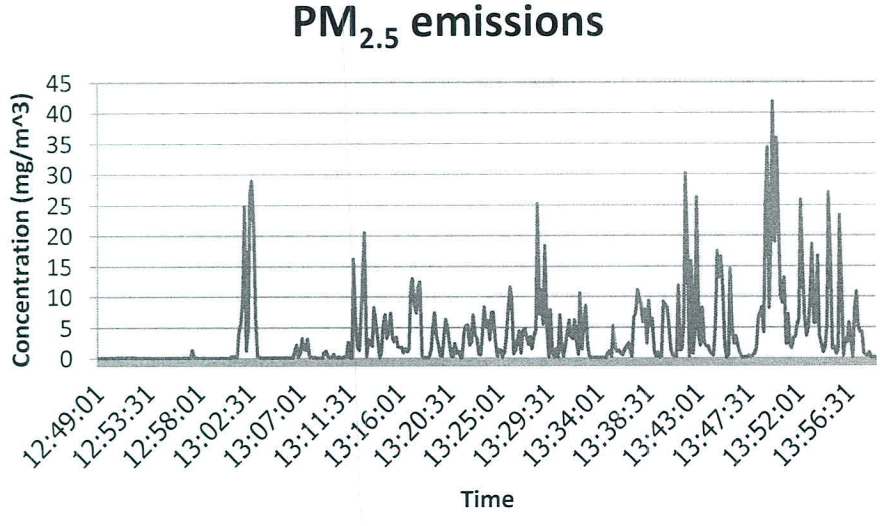


Figure D.8 Emission concentrations of BC and $PM_{2.5}$ from prescribed fire in MDF3

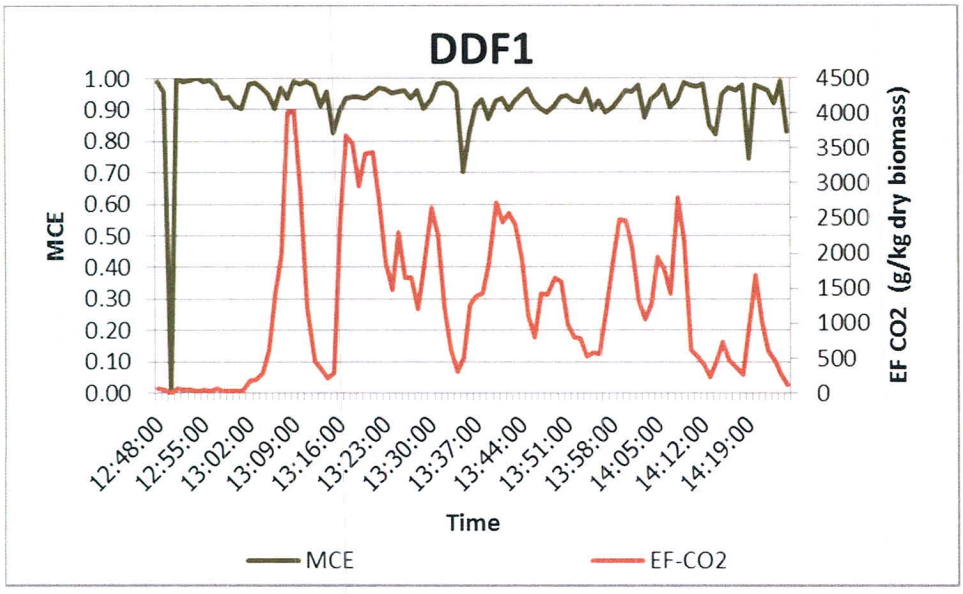


Figure D.9 Modified combustion efficiency and emission factor of CO_2 in DDF1

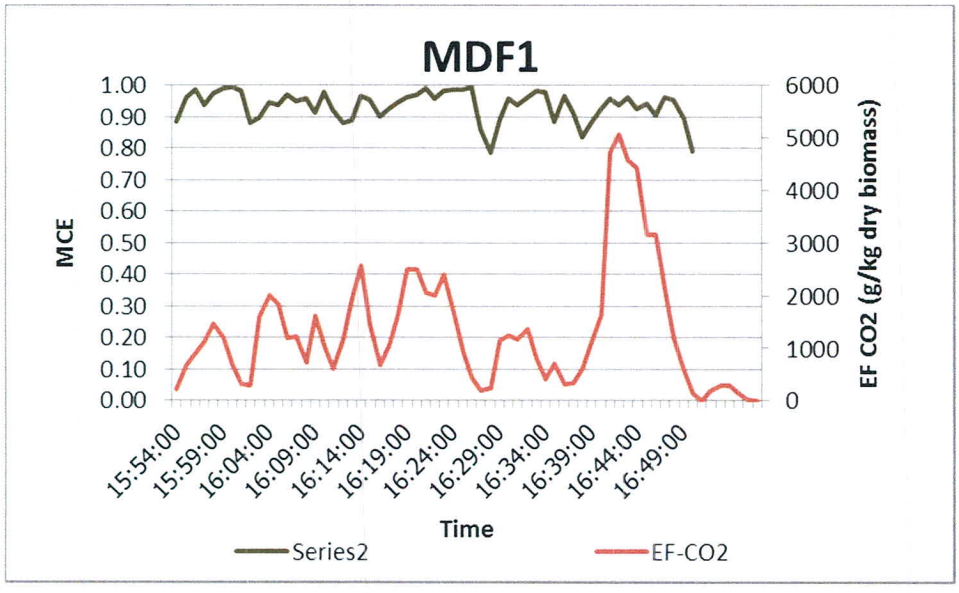


Figure D.10 Modified combustion efficiency and emission factor of CO_2 in MDF1

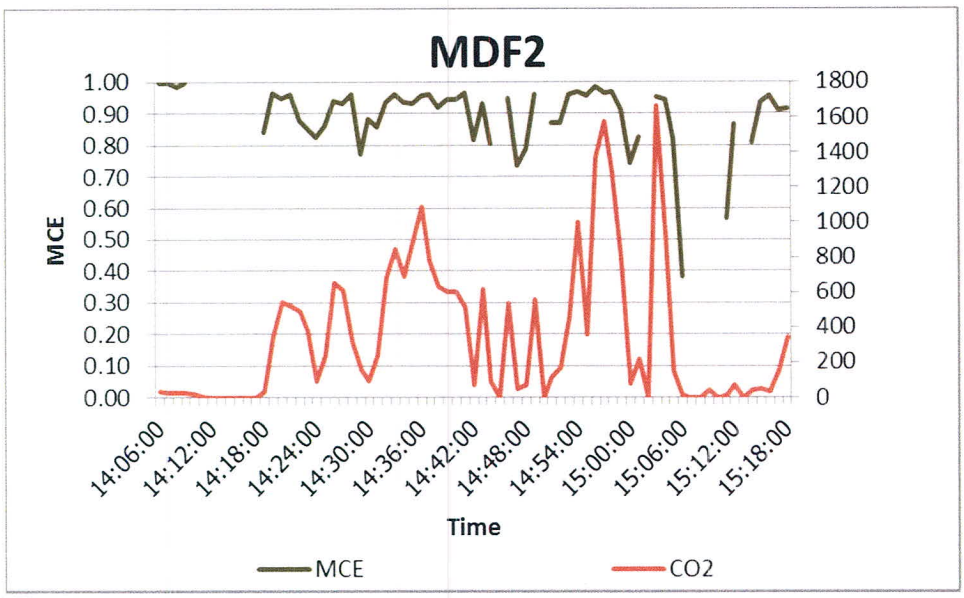


Figure D.11 Modified combustion efficiency and emission factor of CO_2 in MDF2

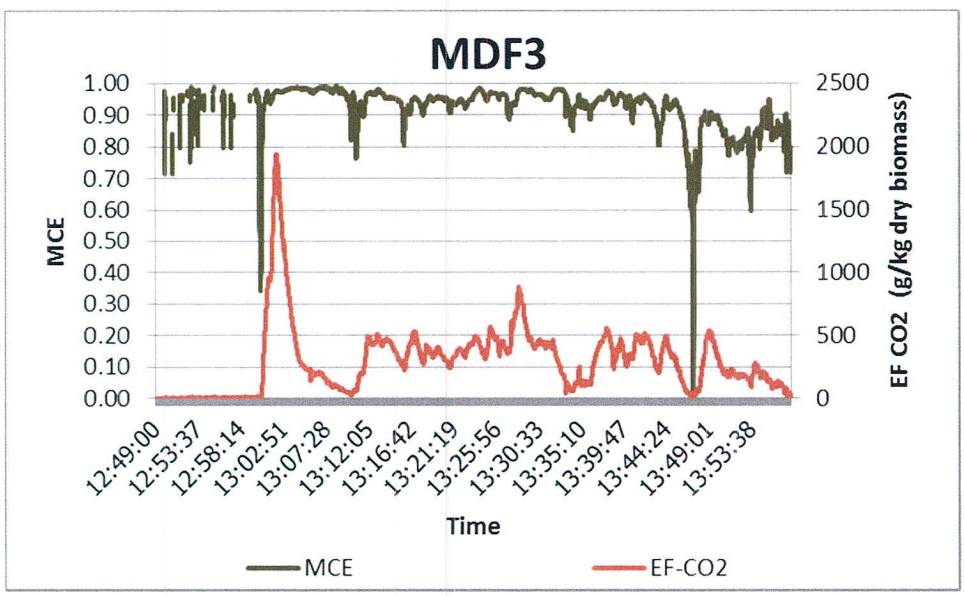


Figure D.12 Modified combustion efficiency and emission factor of CO_2 in MDF3