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Supplement of

Investigation of error sources in regional inverse estimates of greenhouse gas emissions in Canada

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Supplementary information

Table S1. Results of the synthetic data experiments presented in Table 3. Table S1, S3 and Table S2, S4 correspond to results using the MCMC and CFM estimation methods respectively. The monthly and annual (Y2009) estimation biases (relative percentage differences from the target) are presented, i.e. (posterior estimate – target)/target x 100%. The standard deviations (YSTD) of the monthly estimation biases are shown in the last column. Color codes in red, orange, yellow, gray, light blue, and dark blue represent relative percentage differences that are greater than 100, between 50 and 100, between 20 and 50, between -10 and -25, between -25 and -50, and less than -50 respectively.

Table S1 (MCMC).

Province	Experiment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Y2009	YSTD
AB/SK	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AB/SK	2	0	0	0	-0	0	0	0	-0	0	0	0	0	0	0
AB/SK	3	0	0	0	-0	0	-0	-0	0	-0	0	0	0	0	0
AB/SK	4	0	0	0	-0	0	0	-0	0	0	0	0	0	0	0
AB/SK	5	0	0	0	0	0	0	0	0	-0	0	0	0	0	0
AB/SK	6	0	0	0	-0	0	0	-0	-0	-0	-0	0	0	0	0
AB/SK	7	0	0	0	-0	0	0	0	-0	0	0	0	0	0	0
AB/SK	8	-0	0	0	0	-0	-0	-0	0	0	-0	-0	0	-0	0
AB/SK	9	-0	0	0	-0	-0	0	-0	-0	0	0	0	0	0	0
AB/SK	10	0	0	-0	0	1	0	0	0	-0	1	0	0	0	0
AB/SK	11	-7	-8	-11	-8	-7	-8	-9	-9	-6	-8	-13	-11	-9	2
AB/SK	12	-4	-6	-7	-7	-7	-7	-7	-7	-6	-7	-8	-7	-7	1
AB/SK	13	-4	-5	-8	-9	-6	-8	-7	-10	-7	-7	-12	-7	-7	2
AB/SK	14	-4	-3	-5	-10	-7	-8	-7	-10	-7	-6	-9	-6	-7	2
AB/SK	15	-3	-4	-6	-9	-7	-9	-7	-9	-7	-8	-9	-6	-7	2
AB/SK	16	-4	-5	-6	-10	-9	-10	-8	-10	-8	-9	-10	-7	-8	2
AB/SK	17	-5	-5	-7	-11	-10	-11	-9	-8	-10	-8	-9	-5	-8	2
AB/SK	18	-1	60	65	18	46	8	-46	12	26	51	57	16	27	32
AB/SK	19	-1	55	58	75	41	16	-32	7	58	46	67	19	34	32
AB/SK	20	-2	54	57	88	47	-9	-16	6	82	42	60	13	35	36
AB/SK	21	-4	58	56	73	51	15	-19	-3	93	41	53	16	36	34
AB/SK	22	10	51	36	87	2	5	-10	1	60	38	54	18	30	30
AB/SK	23	1	48	46	50	46	2	-17	-2	54	39	37	11	26	25
AB/SK	24	-5	47	34	47	59	-3	-19	10	50	36	37	7	25	26
AB/SK	25	-6	48	39	67	48	-11	-29	2	88	30	29	4	25	35
AB/SK	26	-2	44	36	77	14	6	**-53**	0	72	20	26	2	20	35
AB/SK	27	-9	29	44	38	0	-3	-23	2	8	36	27	2	13	22
AB/SK	28	-14	37	32	24	-31	-27	**-53**	-7	32	27	26	-1	5	30
AB/SK	29	-9	39	38	43	8	10	-33	-16	13	17	23	-2	11	23
AB/SK	30	-11	37	23	31	-17	4	-28	-25	45	21	12	-3	8	24
AB/SK	31	-15	31	21	33	5	-25	-44	-10	25	16	10	-7	4	24

Table S2 (CFM).

Province	Experiment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Y2009	YSTD
AB/SK	32	1	1	3	21	36	30	20	18	21	8	4	1	13	12
AB/SK	33	3	6	12	29	41	36	29	26	28	13	14	5	19	13
AB/SK	34	3	6	12	30	41	36	29	26	29	14	15	5	20	13
AB/SK	35	15	20	32	80	88	82	79	74	74	49	30	19	51	29
AB/SK	36	0	1	5	9	9	12	9	8	9	3	5	1	6	4
AB/SK	37	1	2	7	12	13	16	12	11	14	5	8	2	8	5
AB/SK	38	1	3	9	18	19	23	17	17	17	8	9	2	11	7
AB/SK	39	3	3	11	22	27	32	23	17	25	12	13	3	15	10
AB/SK	40	6	6	14	26	29	35	30	21	30	16	17	5	19	10
AB/SK	41	8	8	16	29	36	36	32	25	33	19	23	8	22	11
AB/SK	42	-7	-8	-11	-6	-3	-4	-6	-6	-3	-7	-13	-11	-7	3
AB/SK	43	-4	-5	-7	-2	-2	-1	-3	-3	-1	-5	-7	-7	-4	2
AB/SK	44	-4	-5	-7	-1	1	3	-0	-4	2	-4	-8	-6	-3	4
AB/SK	45	-3	-2	-2	2	6	7	4	2	5	-2	-6	-5	0	4
AB/SK	46	-1	-3	-0	6	10	13	10	3	10	-0	-2	-4	3	6
AB/SK	47	1	-1	1	8	13	15	12	6	12	2	-0	-3	5	6
AB/SK	48	0	-0	4	10	16	14	15	10	14	3	3	-0	7	6
AB/SK	49	0	61	70	89	55	19	-41	-6	88	57	48	13	37	40
AB/SK	50	6	56	66	86	23	7	-2	13	97	40	**122**	23	45	41
AB/SK	51	1	57	56	60	37	-0	-8	17	49	57	99	20	37	32
AB/SK	52	-3	61	55	27	16	27	-4	34	**129**	47	76	18	40	37
AB/SK	53	11	55	55	45	74	49	-9	19	79	48	82	42	45	28
AB/SK	54	15	60	71	83	47	34	31	29	50	52	93	37	50	23
AB/SK	55	-1	47	60	80	56	43	4	29	84	62	76	18	46	29
AB/SK	56	-6	52	53	52	1	12	-22	10	**103**	26	38	8	27	34
AB/SK	57	-2	51	41	57	24	-2	-32	21	62	31	51	7	26	29
AB/SK	58	-5	42	44	50	34	-12	0	1	41	40	47	15	25	23
AB/SK	59	-11	50	55	71	30	16	-28	3	59	40	51	8	29	31
AB/SK	60	1	55	54	44	25	6	-7	-0	62	32	56	26	30	25
AB/SK	61	-0	44	56	62	44	19	-23	8	66	41	52	25	33	27
AB/SK	62	-4	39	28	44	2	10	-7	12	57	44	39	11	23	22

Table S3 (MCMC).

Province	Experiment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Y2009	YSTD
ON	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ON	2	0	-0	0	0	0	0	0	0	0	0	0	0	0	0
ON	3	0	0	0	0	-0	0	0	0	0	0	0	0	0	0
ON	4	0	-0	0	0	0	0	0	-0	0	0	0	0	0	0
ON	5	0	0	0	0	-0	0	0	-0	0	0	-0	0	0	0
ON	6	0	0	0	0	-0	0	-0	-0	-0	0	0	0	0	0
ON	7	0	0	0	0	0	0	-0	-0	0	0	0	0	0	0
ON	8	-0	-0	0	-0	0	-0	0	-0	0	0	-0	-0	-0	0
ON	9	-0	0	-0	-0	-0	0	-0	0	0	0	1	-0	0	0
ON	10	0	1	0	-0	0	1	0	0	0	0	0	0	0	0
ON	11	-16	-19	-16	-18	-18	-18	-17	-14	-17	-18	-18	-15	-17	1
ON	12	-8	-7	-5	-11	-11	-7	-11	-3	-15	-14	-7	-11	-9	4
ON	13	-2	-8	4	-11	-8	1	-7	6	-4	-5	-1	-5	-3	5
ON	14	-2	-7	3	-10	-7	-1	-7	4	-4	-5	-1	-5	-4	4
ON	15	-2	-2	2	-5	-5	1	1	-1	-4	-2	1	-7	-2	3
ON	16	-2	-3	-1	-4	-4	0	-1	-2	-4	-3	0	-6	-3	2
ON	17	-2	-3	-3	-4	-4	-2	-2	-3	-4	-5	-3	-7	-3	1
ON	18	**135**	91	**177**	**146**	-9	-21	8	**120**	**199**	37	**105**	**157**	98	75
ON	19	**109**	75	**137**	**119**	-7	-11	7	86	**159**	45	87	**120**	79	57
ON	20	91	94	**149**	94	76	49	15	**146**	93	56	**115**	**133**	94	40
ON	21	68	69	**125**	**100**	55	24	-19	**130**	47	46	**129**	**141**	78	50
ON	22	10	23	75	64	50	4	-17	79	49	34	66	46	40	30
ON	23	27	28	65	46	21	-13	-13	65	53	21	62	43	34	27
ON	24	8	12	55	23	2	-13	-15	50	34	14	41	38	21	23
ON	25	97	57	**137**	95	-26	**-52**	-9	81	**151**	14	79	**121**	64	66
ON	26	89	55	**116**	77	-17	-15	-4	71	**133**	23	67	94	59	50
ON	27	94	78	**132**	78	60	56	-10	**150**	77	37	**127**	**130**	85	46
ON	28	57	55	**118**	57	68	35	-26	**129**	32	40	**148**	**125**	71	51
ON	29	-3	10	68	41	39	5	-25	69	50	29	56	32	31	29
ON	30	16	16	56	36	17	-16	-17	60	54	15	56	36	28	27
ON	31	-8	4	52	10	4	-13	-14	48	40	6	25	31	16	23

Table S4 (CFM).

Province	Experiment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Y2009	YSTD
ON	32	0	0	1	1	1	1	1	1	1	-0	-0	1	1	1
ON	33	15	21	22	20	23	17	19	22	20	9	14	16	18	4
ON	34	15	20	21	21	24	18	20	23	19	9	13	16	18	4
ON	35	27	27	29	34	30	26	29	30	28	23	26	28	28	3
ON	36	3	7	9	8	16	6	7	12	6	2	2	4	7	4
ON	37	6	10	14	22	20	14	14	16	16	7	4	11	13	5
ON	38	8	12	16	24	21	15	16	18	17	9	5	13	14	5
ON	39	17	28	25	38	29	30	28	27	38	16	14	29	26	8
ON	40	26	37	32	48	35	39	36	32	47	21	20	37	34	9
ON	41	38	46	38	58	43	47	43	39	54	30	30	43	42	8
ON	42	-16	-19	-16	-18	-18	-18	-17	-14	-17	-18	-18	-15	-17	1
ON	43	-5	-1	6	-3	5	-2	-3	7	-8	-12	-5	-6	-3	6
ON	44	3	2	15	8	11	13	5	18	11	-0	2	5	8	6
ON	45	5	2	16	11	15	12	7	18	13	2	4	7	9	6
ON	46	14	24	25	31	22	27	28	25	33	10	13	21	23	7
ON	47	22	32	30	43	29	38	33	31	43	17	18	29	30	9
ON	48	35	39	35	54	37	46	41	36	50	22	25	34	38	9
ON	49	**138**	84	**192**	**127**	-10	-42	16	**127**	**203**	44	**133**	**160**	**100**	79
ON	50	**170**	**263**	**247**	**205**	-21	18	-17	61	**378**	**148**	**159**	**122**	**147**	121
ON	51	**198**	**376**	**298**	**254**	**135**	**135**	-3	**201**	**291**	**173**	**331**	**342**	**232**	109
ON	52	**184**	**235**	**277**	**234**	**105**	**107**	-18	**170**	**141**	**198**	**308**	**268**	**187**	91
ON	53	26	61	**200**	**229**	**134**	49	-13	**108**	86	**368**	85	50	**113**	105
ON	54	8	44	**191**	**165**	**108**	68	4	**106**	76	**319**	77	72	**101**	87
ON	55	-4	70	**181**	**116**	**135**	36	17	71	**117**	**101**	42	79	79	53
ON	56	**100**	50	**138**	86	-26	-47	-3	87	**148**	14	84	**121**	65	65
ON	57	**156**	**252**	**265**	**125**	-13	39	-4	93	**346**	100	26	79	**124**	114
ON	58	**180**	**287**	**335**	**248**	90	**110**	-4	**196**	**241**	**139**	**263**	**283**	**201**	98
ON	59	**170**	**204**	**286**	**182**	**101**	98	-8	**223**	**150**	**193**	**277**	**228**	**178**	82
ON	60	41	71	**237**	**186**	**122**	90	-3	**100**	**120**	**338**	82	55	**118**	93
ON	61	14	38	**184**	**119**	**116**	24	4	**106**	**145**	**307**	**102**	45	98	86
ON	62	7	54	**165**	**114**	**140**	35	6	66	**122**	85	32	68	73	52