Will the Role of Intercontinental Transport Change in a Changing Climate?

Supplement

Table A1. Emissions Growth Factors for the Year 2050

Species	Source	Canada	USA	Central America	South America	North Africa	West Africa	East Africa	South Africa	OECP Europe	Eastern Europe	Former USSR	Middle East	South Asia	East Asia	Southeast Asia	Oceania	Japan
ALD2	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	BF	0.66	0.94	1.32	1.16	0.30	1.45	1.64	1.06	0.63	0.74	0.93	0.26	0.93	0.68	0.90	0.68	0.56
	AT	0.31	0.26	0.56	0.55	4.03	3.58	7.97	2.34	0.36	0.43	0.90	0.85	3.04	0.77	1.10	0.29	0.49
FORM	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	BF	0.66	0.94	1.32	1.16	0.30	1.45	1.65	1.06	0.63	0.74	0.93	0.26	0.93	0.68	0.90	0.68	0.56
	AT	1.44	1.68	3.68	3.40	7.45	12.65	20.42	6.41	1.55	4.79	5.17	2.48	13.62	7.26	5.88	1.30	1.61
ETOH	BB	0.24	0.47	0.33	1.05	0.44	0.42	0.55	0.18	0.37	0.35	0.24	0.36	0.33	0.11	0.68	0.64	1.08
and	BF	0.66	0.94	1.32	1.16	0.30	1.45	1.65	1.06	0.63	0.74	0.93	0.26	0.93	0.68	0.90	0.68	0.56
MEOH	AT	0.96	0.97	2.38	2.20	4.68	7.97	10.71	3.64	1.01	3.54	3.76	1.54	8.88	4.74	4.21	0.88	1.24
ETHA	BB	0.01	0.27	0.19	0.74	0.31	0.26	0.32	0.10	0.21	0.26	0.03	0.26	0.18	0.02	0.49	0.39	0.87
	BF	0.39	0.55	0.78	0.69	0.18	0.86	0.97	0.63	0.37	0.44	0.55	0.15	0.55	0.40	0.53	0.40	0.33
	AT	0.48	0.47	1.07	3.22	1.38	3.21	9.34	5.88	0.74	0.89	1.37	2.31	2.86	2.86	1.40	0.39	0.67
HC	Total	0.47	0.47	1.07	3.13	1.37	3.07	3.20	4.20	0.74	0.88	1.36	2.31	1.99	2.49	1.29	0.39	0.67
KET	BB	0.24	0.47	0.33	1.05	0.44	0.42	0.55	0.18	0.37	0.35	0.24	0.36	0.33	0.11	0.68	0.64	1.08
	AT	0.52	0.67	0.44	0.35	1.58	0.26	0.90	0.40	0.86	0.79	2.28	0.40	0.45	0.52	0.35	0.95	0.33
ETH	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	BF	0.66	0.94	1.32	1.16	0.30	1.45	1.65	1.06	0.63	0.74	0.93	0.26	0.93	0.68	0.90	0.68	0.56
	AT	1.05	0.86	3.22	2.96	5.15	12.38	14.87	4.92	1.01	4.40	5.52	1.39	17.94	9.55	6.87	0.97	1.22
OLE and	BB	0.02	0.31	0.26	1.00	0.38	0.36	0.44	0.14	0.24	0.31	0.04	0.33	0.22	0.02	0.64	0.52	1.02
IOLE	BF	0.66	0.94	1.32	1.16	0.30	1.45	1.65	1.06	0.63	0.74	0.93	0.26	0.93	0.68	0.90	0.68	0.56
	AT	0.37	0.35	0.65	0.67	4.12	3.82	8.02	2.45	0.41	0.47	0.76	0.90	3.02	0.82	1.22	0.32	0.53
AACD	Total	0.94	0.97	2.23	2.02	4.10	3.71	3.27	2.29	1.00	3.46	3.53	1.49	3.91	3.32	3.11	0.87	1.23
TOL	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	AT	1.03	1.03	2.61	2.32	4.27	5.91	5.02	2.75	1.09	4.11	4.11	1.58	6.57	4.75	4.22	0.96	1.29
XYL	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	AT	0.97	0.92	2.56	2.25	4.49	5.84	5.27	2.91	1.03	4.10	4.13	1.38	6.72	4.73	4.16	0.93	1.25
CO	BB	0.03	0.72	0.50	1.83	0.71	0.62	0.79	0.22	0.58	0.57	0.07	0.59	0.48	0.03	1.26	0.96	2.56
	AT	0.54	0.44	0.94	1.05	3.82	1.82	2.19	1.72	0.53	0.57	1.10	1.04	1.38	0.81	1.11	0.46	0.69
CH_4	BB	0.03	0.78	0.30	2.13	0.75	0.72	0.80	0.22	0.67	0.66	0.07	0.54	0.39	0.04	1.27	1.10	3.58
	AT	0.78	0.39	1.82	3.87	1.97	4.86	1.91	9.15	0.84	0.42	2.18	6.99	1.75	1.73	1.86	1.74	0.44
CRES	Total	0.94	0.97	2.23	2.02	4.10	3.71	3.27	2.29	1.00	3.46	3.53	1.49	3.91	3.32	3.11	0.87	1.23
NO_x,	BB	0.04	0.98	1.30	1.50	1.23	0.47	0.67	0.18	0.75	0.82	0.10	1.02	0.89	0.04	1.69	0.76	2.88
and NO_3	AT	0.97	0.89	3.36	3.62	9.17	6.72	8.40	5.16	1.02	2.58	2.11	3.84	8.63	2.94	4.80	1.03	1.01
N_2O	Total	1.07	2.07	3.07	4.07	5.07	6.07	7.07	8.07	9.07	10.07	11.07	12.07	13.07	14.07	15.07	16.07	17.07
NH_3	BB	1.16	1.01	0.91	1.35	0.76	0.82	1.28	0.36	0.79	0.58	1.00	0.48	1.78	0.96	1.01	1.54	1.85
	AG	1.05	1.42	1.91	1.40	2.27	2.99	2.21	2.80	1.20	1.23	1.60	3.21	1.30	0.76	2.14	0.86	1.96
	AT	0.62	0.89	1.34	1.23	0.16	1.67	1.85	1.20	0.61	0.60	0.37	0.30	1.04	0.64	0.96	0.74	0.90
SO_2 and	BB	0.03	0.80	0.93	3.40	1.17	1.15	1.50	0.42	0.64	0.85	0.08	1.15	0.99	0.06	2.36	1.84	6.81
SO_4^{2-}	AT	0.26	0.25	1.81	7.46	7.26	9.09	14.81	6.87	0.37	0.23	0.37	1.09	3.93	0.89	3.59	0.43	0.26
BC	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13
	AT	0.58	0.49	1.70	1.01	2.99	0.93	1.97	1.42	0.57	1.06	1.63	1.69	1.88	0.76	1.10	0.85	0.26
OC	BB	1.12	0.96	0.80	1.40	0.98	0.79	1.27	0.40	0.72	0.75	1.04	0.51	1.42	0.93	0.96	1.51	1.63
	AT	0.52	0.67	0.44	0.35	1.58	0.26	0.90	0.40	0.86	0.79	2.28	0.40	0.45	0.52	0.35	0.95	0.33
OIN	BB	1.19	1.05	0.81	1.37	1.72	0.78	1.30	0.40	0.86	0.74	1.04	0.73	1.72	1.00	0.96	1.45	2.13

Table Captions

Table A1.

Growth factors applied to base year emissions to generate 2050 projected emissions. The emissions growth factors vary depending on the 17 world regions shown and based on the emissions sources. These sources include biomass burning (BB), bio-fuels (BF), agriculture (AG), anthropogenic sources (AT), or total non-source specific emissions (Total). * The GU-WRF/Chem emissions are generated based on the Regional Acid Deposition Model version 2 (RADM2) format and later mapped to the carbon bond 2005 with global extension (CB05GE) mechanism species as shown in the above table. As a result par emissions are calculated based on several species including those that are mapped to AACD, OLE, IOLE, and ALD2. However, PAR is also comprised of some other RADM2 species including HC3, HC5, and HC8 which are referred to as HC in the table and ketone (KET). The equation for PAR emissions is listed in Table 2 of Zhang et al., (2012).

References

Zhang, Y., P. Karamchandani, T. Glotfelty, D. G. Streets, G. Grell, A. Nenes, F. Yu, and R. Bennartz (2012), Development and initial application of the global-through-urban weather research and forecasting model with chemistry (GU-WRF/Chem), *J. Geophys. Res.*, *117*, D20206, doi:10.1029/2012JD017966