Influence of the Change in Total Ozone Column (TOC) on the Occurrence of Tropospheric Ozone Depletion Events (ODEs) in the Antarctic: Supplement

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Table S1. Correlation coefficients of the change in TOC between stations in the Antarctic.

	Halley	Arrival Heights	Dumont D'Urville	South Pole	Belgrano II	Faraday-Vernadsky
Halley	1	0.87	0.78	0.70	0.76	0.39
Arrival Heights	0.87	1	0.79	0.64	0.64	0.33
Dumont D'Urville	0.78	0.79	1	0.73	0.82	0.31
South Pole	0.70	0.64	0.73	1	0.87	0.63
Belgrano II	0.76	0.64	0.82	0.87	1	0.52
Faraday-Vernadsky	0.39	0.33	0.31	0.63	0.52	1

Table S2. The complete chemical reaction mechanism with an implementation of a constant temperature $T = 258\,\mathrm{K}$, and the rate of third-body reactions is estimated as $k = k_\infty \times \frac{k_0/k_\infty}{(1+k_0/k_\infty)} \times F_c^{\frac{1}{1+(\log_{10}(k_0/k_\infty))^2}}$ (Atkinson et al., 2006).

Reaction Number	Reaction	k $[(\mathrm{molec.\ cm^{-3}})^{1-n}\mathrm{s^{-1}}]$	Order n	Reference
(SR1)	$O_3 + h\nu \rightarrow O(^1D) + O_2$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR2)	$O(^1D) + O_2 \rightarrow O_3$	$3.20 \times 10^{-11}\exp(67/T)$	2	Atkinson et al. (2006)
(SR3)	$O(^1D) + N_2 \rightarrow O_3 + N_2$	$1.80 \times 10^{-11}\exp(107/T)$	2	Atkinson et al. (2006)
(SR4)	$O(^1D) + H_2O \rightarrow 2OH$	2.20×10^{-10}	2	Atkinson et al. (2006)
(SR5)	$Br + O_3 \rightarrow BrO + O_2$	$1.70 \times 10^{-11}\exp(-800/T)$	2	Atkinson et al. (2006)
(SR6)	$Br_2 + h\nu \rightarrow 2Br$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR7)	$BrO + h\nu \xrightarrow{O_2} Br + O_3$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR8)	$BrO + BrO \rightarrow 2Br + O_2$	2.70×10^{-12}	2	Atkinson et al. (2006)
(SR9)	$BrO + BrO \rightarrow Br_2 + O_2$	$2.90 \times 10^{-14}\exp(840/T)$	2	Atkinson et al. (2006)
(SR10)	$BrO + HO_2 \rightarrow HOBr + O_2$	$4.5 \times 10^{-12}\exp(500/T)$	2	Atkinson et al. (2006)
(SR11)	$HOBr + h\nu \rightarrow Br + OH$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR12)	$CO + OH(+M) \xrightarrow{O_2} HO_2 + CO_2(+M)$	$1.44 \times 10^{-13}(1 + \frac{[N_2]}{4\times10^{19}})$	2	Atkinson et al. (2006)
(SR13)	$Br + HO_2 \rightarrow HBr + O_2$	$7.70 \times 10^{-12}\exp(-450/T)$	2	Atkinson et al. (2006)
(SR14)	$HOBr + HBr \xrightarrow{\mathrm{aerosol}} Br_2 + H_2O$	$(\frac{r}{D_\mathrm{g}} + \frac{4}{v_\mathrm{therm}\gamma})^{-1}\alpha_{\mathrm{eff,aerosol}}$		Cao et al. (2014)
(SR15)	$HOBr + H^+ + Br^- \xrightarrow{\mathrm{ice}} Br_2 + H_2O$	$(r_a + r_b + r_c)^{-1}\alpha_{\mathrm{eff,ice}}$		Cao et al. (2014)
(SR16)	$Br + HCHO \xrightarrow{O_2} HBr + CO + HO_2$	$7.70 \times 10^{-12}\exp(-580/T)$	2	Atkinson et al. (2006)
(SR17)	$Br + CH_3CHO \xrightarrow{O_2} HBr + CH_3CO_3$	$1.80 \times 10^{-11}\exp(-460/T)$	2	Atkinson et al. (2006)
(SR18)	$Br_2 + OH \rightarrow HOBr + Br$	$2.0 \times 10^{-11}\exp(240/T)$	2	Atkinson et al. (2006)
(SR19)	$HBr + OH \rightarrow H_2O + Br$	$5.50 \times 10^{-12}\exp(205/T)$	2	Atkinson et al. (2006)
(SR20)	$Br + C_2H_2 \xrightarrow{3O_2} 2CO + 2HO_2 + Br$	4.20×10^{-14}	2	Borken (1996)
(SR21)	$Br + C_2H_2 \xrightarrow{2O_2} 2CO + HO_2 + HBr$	8.92×10^{-14}	2	Borken (1996)
(SR22)	$Br + C_2H_4 \xrightarrow{3.5O_2} 2CO + 2HO_2 + Br + H_2O$	2.52×10^{-13}	2	Barnes et al. (1993)
(SR23)	$Br + C_2H_4 \xrightarrow{2.5O_2} 2CO + HO_2 + HBr + H_2O$	5.34×10^{-13}	2	Barnes et al. (1993)
(SR24)	$CH_4 + OH \xrightarrow{O_2} CH_3O_2 + H_2O$	$1.85 \times 10^{-12}\exp(-1690/T)$	2	Atkinson et al. (2006)
(SR25)	$BrO + CH_3O_2 \rightarrow Br + HCHO + HO_2$	1.60×10^{-12}	2	Aranda et al. (1997)
(SR26)	$BrO + CH_3O_2 \rightarrow HOBr + HCHO + 0.5O_2$	4.10×10^{-12}	2	Aranda et al. (1997)
(SR27)	$OH + O_3 \rightarrow HO_2 + O_2$	$1.70 \times 10^{-12}\exp(-940/T)$	2	Atkinson et al. (2006)
(SR28)	$OH + HO_2 \rightarrow H_2O + O_2$	$4.80 \times 10^{-11}\exp(250/T)$	2	Atkinson et al. (2006)
(SR29)	$OH + H_2O_2 \rightarrow HO_2 + H_2O$	$2.90 \times 10^{-12}\exp(-160/T)$	2	Atkinson et al. (2006)
(SR30)	$OH + OH \xrightarrow{O_2} H_2O + O_3$	$6.20 \times 10^{-14}(T/298)^{2.6}\exp(945/T)$	2	Atkinson et al. (2006)
(SR31)	$HO_2 + O_3 \rightarrow OH + 2O_2$	$2.03 \times 10^{-16}(T/300)^{4.57}\exp(693/T)$	2	Atkinson et al. (2006)
(SR32)	$HO_2 + HO_2 \rightarrow O_2 + H_2O_2$	$2.20 \times 10^{-13}\exp(600/T)$	2	Atkinson et al. (2006)
(SR33)	$C_2H_6 + OH \rightarrow C_2H_5 + H_2O$	$6.90 \times 10^{-12}\exp(-1000/T)$	2	Atkinson et al. (2006)
(SR34)	$C_2H_5 + O_2 \rightarrow C_2H_4 + HO_2$	3.80×10^{-15}	2	Atkinson et al. (2006)

Table S2. (continued).

Reaction Number	Reaction	k $[(\mathrm{molec.\ cm^{-3}})^{1-n}\mathrm{s^{-1}}]$	Order n	Reference
(SR35)	$C_2H_5 + O_2(+M) \rightarrow C_2H_5O_2(+M)$	$k_0 = 5.90 \times 10^{-29}(T/300)^{-3.8}[N_2]$ $k_\infty = 7.80 \times 10^{-12}$ $F_c = 0.58\exp(-T/1250)$ $+0.42\exp(-T/183)$	2	Atkinson et al. (2006)
(SR36)	$C_2H_4 + OH(+M) \xrightarrow{1.5O_2} CH_3O_2 + CO + H_2O(+M)$	$k_0 = 8.60 \times 10^{-29}(T/300)^{-3.1}[N_2]$ $k_\infty = 9.00 \times 10^{-12}(T/300)^{-0.85}$ $F_c = 0.48$	2	Atkinson et al. (2006)
(SR37)	$C_2H_4 + O_3 \rightarrow HCHO + CO + H_2O$	4.33×10^{-19}	2	Sander et al. (1997)
(SR38)	$C_2H_2 + OH(+M) \xrightarrow{1.5O_2} HCHO + CO + HO_2(+M)$	$k_0 = 5.00 \times 10^{-30}(T/300)^{-1.5}[N_2]$ $k_\infty = 1.00 \times 10^{-12}$ $F_c = 0.37$	2	Atkinson et al. (2006)
(SR39)	$C_3H_8 + OH \xrightarrow{2O_2} C_2H_5O_2 + CO + 2H_2O$	$7.60 \times 10^{-12}\exp(-585/T)$	2	Atkinson et al. (2006)
(SR40)	$HCHO + OH \xrightarrow{O_2} CO + H_2O + HO_2$	$5.40 \times 10^{-12}\exp(135/T)$	2	Atkinson et al. (2006)
(SR41)	$CH_3CHO + OH \xrightarrow{O_2} CH_3CO_3 + H_2O$	$4.40 \times 10^{-12}\exp(365/T)$	2	Atkinson et al. (2006)
(SR42)	$CH_3O_2 + HO_2 \rightarrow CH_3O_2H + O_2$	$3.42 \times 10^{-13}\exp(780/T)$	2	Atkinson et al. (2006)
(SR43)	$CH_3O_2 + HO_2 \rightarrow HCHO + H_2O + O_2$	$3.79 \times 10^{-14}\exp(780/T)$	2	Atkinson et al. (2006)
(SR44)	$CH_3OOH + OH \rightarrow CH_3O_2 + H_2O$	$1.00 \times 10^{-12}\exp(190/T)$	2	Atkinson et al. (2006)
(SR45)	$CH_3OOH + OH \rightarrow HCHO + OH + H_2O$	$1.90 \times 10^{-12}\exp(190/T)$	2	Atkinson et al. (2006)
(SR46)	$CH_3OOH + Br \rightarrow CH_3O_2 + HBr$	$2.66 \times 10^{-12}\exp(-1610/T)$	2	Mallard et al. (1993)
(SR47)	$CH_3O_2 + CH_3O_2 \rightarrow CH_3OH + HCHO + O_2$	$6.29 \times 10^{-14}\exp(365/T)$	2	Atkinson et al. (2006)
(SR48)	$CH_3O_2 + CH_3O_2 \xrightarrow{O_2} 2HCHO + 2HO_2$	$3.71 \times 10^{-14}\exp(365/T)$	2	Atkinson et al. (2006)
(SR49)	$CH_3OH + OH \xrightarrow{O_2} HCHO + HO_2 + H_2O$	$2.42 \times 10^{-12}\exp(-345/T)$	2	Atkinson et al. (2006)
(SR50)	$C_2H_5O_2 + C_2H_5O_2 \rightarrow C_2H_5O + C_2H_5O + O_2$	6.40×10^{-14}	2	Atkinson et al. (2006)
(SR51)	$C_2H_5O + O_2 \rightarrow CH_3CHO + HO_2$	7.44×10^{-15}	2	Sander et al. (1997)
(SR52)	$C_2H_5O + O_2 \rightarrow CH_3O_2 + HCHO$	7.51×10^{-17}	2	Sander et al. (1997)
(SR53)	$C_2H_5O_2 + HO_2 \rightarrow C_2H_5OOH + O_2$	$3.80 \times 10^{-13}\exp(900/T)$	2	Atkinson et al. (2006)
(SR54)	$C_2H_5OOH + OH \rightarrow C_2H_5O_2 + H_2O$	8.21×10^{-12}	2	Sander et al. (1997)
(SR55)	$C_2H_5OOH + Br \rightarrow C_2H_5O_2 + HBr$	5.19×10^{-15}	2	Sander et al. (1997)
(SR56)	$OH + OH(+M) \longrightarrow H_2O_2(+M)$	$k_0 = 6.90 \times 10^{-31}(T/300)^{-0.8}[N_2]$ $k_\infty = 2.60 \times 10^{-11}$ $F_c = 0.50$	2	Atkinson et al. (2006)
(SR57)	$H_2O_2 + h\nu \rightarrow 2OH$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR58)	$HCHO + h\nu \xrightarrow{2O_2} 2HO_2 + CO$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR59)	$HCHO + h\nu \rightarrow H_2 + CO$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR60)	$C_2H_4O + h\nu \rightarrow CH_3O_2 + CO + +HO_2$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR61)	$CH_3O_2H + h\nu \rightarrow OH + HCHO + HO_2$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR62)	$C_2H_5O_2H + h\nu \rightarrow C_2H_5O + OH$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR63)	$NO + O_3 \rightarrow NO_2 + O_2$	$1.40 \times 10^{-12}\exp(-1310/T)$	2	Atkinson et al. (2006)
(SR64)	$NO + HO_2 \rightarrow NO_2 + OH$	$3.60 \times 10^{-12}\exp(270/T)$	2	Atkinson et al. (2006)
(SR65)	$NO_2 + O_3 \rightarrow NO_3 + O_2$	$1.40 \times 10^{-13}\exp(-2470/T)$	2	Atkinson et al. (2006)
(SR66)	$NO_2 + OH(+M) \rightarrow HNO_3(+M)$	$k_0 = 3.30 \times 10^{-30}(T/300)^{-3.0}[N_2]$ $k_\infty = 4.10 \times 10^{-11}$ $F_c = 0.40$	2	Atkinson et al. (2006)
(SR67)	$NO + NO_3 \rightarrow 2NO_2$	$1.80 \times 10^{-11}\exp(110/T)$	2	Atkinson et al. (2006)
(SR68)	$HONO + OH \rightarrow NO_2 + H_2O$	$2.50 \times 10^{-12}\exp(260/T)$	2	Atkinson et al. (2006)
(SR69)	$HO_2 + NO_2(+M) \rightarrow HNO_4(+M)$	$k_0 = 1.80 \times 10^{-31}(T/300)^{-3.2}[N_2]$ $k_\infty = 4.70 \times 10^{-12}$ $F_c = 0.60$	2	Atkinson et al. (2006)
(SR70)	$HNO_4(+M) \rightarrow NO_2 + HO_2(+M)$	$k_0 = 4.10 \times 10^{-5}\exp(-10650/T)[N_2]$ $k_\infty = 4.80 \times 10^{15}\exp(-11170/T)$ $F_c = 0.60$	1	Atkinson et al. (2006)

Table S2. (continued).

Reaction Number	Reaction	k $[(\mathrm{molec.\ cm^{-3}})^{1-n}\mathrm{s^{-1}}]$	Order n	Reference
(SR71)	$\mathrm{HNO_4 + OH \rightarrow NO_2 + H_2O + O_2}$	$3.20 \times 10^{-13}\exp(690/T)$	2	Atkinson et al. (2006)
(SR72)	$\mathrm{NO + OH(+M) \rightarrow HONO(+M)}$	$k_0 = 7.40 \times 10^{-31}(T/300)^{-2.4}[\mathrm{N_2}]$ $k_\infty = 3.30 \times 10^{-11}(T/300)^{-0.3}$ $F_c = 0.81$	2	Atkinson et al. (2006)
(SR73)	$\mathrm{OH + NO_3 \rightarrow NO_2 + HO_2}$	2.00×10^{-11}	2	Atkinson et al. (2006)
(SR74)	$\mathrm{HNO_3} + h\nu \rightarrow \mathrm{NO_2 + OH}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR75)	$\mathrm{NO_2} + h\nu \xrightarrow{\mathrm{O_2}} \mathrm{NO + O_3}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR76)	$\mathrm{NO_3} + h\nu \xrightarrow{\mathrm{O_2}} \mathrm{NO_2 + O_3}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR77)	$\mathrm{NO_3} + h\nu \rightarrow \mathrm{NO + O_2}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR78)	$\mathrm{NO + CH_3O_2 \xrightarrow{O_2} HCHO + HO_2 + NO_2}$	$2.30 \times 10^{-12}\exp(360/T)$	2	Atkinson et al. (2006)
(SR79)	$\mathrm{NO_3 + CH_3OH \xrightarrow{O_2} HCHO + HO_2 + HNO_3}$	$9.40 \times 10^{-13}\exp(-2650/T)$	2	Atkinson et al. (2006)
(SR80)	$\mathrm{NO_3 + HCHO \xrightarrow{O_2} CO + HO_2 + HNO_3}$	5.60×10^{-16}	2	Atkinson et al. (2006)
(SR81)	$\mathrm{NO + C_2H_5O_2 \xrightarrow{O_2} CH_3CHO + NO_2 + HO_2}$	$2.60 \times 10^{-12}\exp(380/T)$	2	Atkinson et al. (2006)
(SR82)	$\mathrm{NO + CH_3CO_3 \xrightarrow{O_2} CH_3O_2 + NO_2 + CO_2}$	$7.50 \times 10^{-12}\exp(290/T)$	2	Atkinson et al. (2006)
(SR83)	$\mathrm{NO_2 + CH_3CO_3(+M) \rightarrow PAN(+M)}$	$k_0 = 2.70 \times 10^{-28}(T/300)^{-7.1}[\mathrm{N_2}]$ $k_\infty = 1.20 \times 10^{-11}(T/300)^{-0.9}$ $F_c = 0.30$	2	Atkinson et al. (2006)
(SR84)	$\mathrm{Br + NO_2(+M) \rightarrow BrNO_2(+M)}$	$k_0 = 4.20 \times 10^{-31}(T/300)^{-2.4}[\mathrm{N_2}]$ $k_\infty = 2.70 \times 10^{-11}$ $F_c = 0.55$	2	Atkinson et al. (2006)
(SR85)	$\mathrm{Br + NO_3 \rightarrow BrO + NO_2}$	1.60×10^{-11}	2	Atkinson et al. (2006)
(SR86)	$\mathrm{BrO + NO_2(+M) \rightarrow BrONO_2(+M)}$	$k_0 = 4.70 \times 10^{-31}(T/300)^{-3.1}[\mathrm{N_2}]$ $k_\infty = 1.80 \times 10^{-11}$ $F_c = 0.40$	2	Atkinson et al. (2006)
(SR87)	$\mathrm{BrO + NO \rightarrow Br + NO_2}$	$8.70 \times 10^{-12}\exp(260/T)$	2	Atkinson et al. (2006)
(SR88)	$\mathrm{BrONO_2} + h\nu \rightarrow \mathrm{NO_2 + BrO}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR89)	$\mathrm{BrNO_2} + h\nu \rightarrow \mathrm{NO_2 + Br}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR90)	$\mathrm{BrONO_2 + H_2O \xrightarrow{aerosol} HOBr + HNO_3}$	$(\frac{r}{D_\mathrm{g}} + \frac{4}{v_\mathrm{therm}\gamma})^{-1}\alpha_\mathrm{eff,aerosol}$		Cao et al. (2014)
(SR91)	$\mathrm{PAN} + h\nu \rightarrow \mathrm{NO_2 + CH_3CO_3}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR92)	$\mathrm{BrONO_2 + H_2O \xrightarrow{ice} HOBr + HNO_3}$	$(r_a + r_b + r_c)^{-1}\alpha_\mathrm{eff,ice}$		Cao et al. (2014)
(SR93)	$\mathrm{CH_3O_2H + Cl \rightarrow CH_3O_2 + HCl}$	5.90×10^{-11}	2	Atkinson et al. (2006)
(SR94)	$\mathrm{C_2H_5O_2H + Cl \rightarrow C_2H_5O_2 + HCl}$	5.70×10^{-11}	2	Sander et al. (1997)
(SR95)	$\mathrm{Cl + HO_2 \rightarrow HCl + O_2}$	3.61×10^{-11}	2	Atkinson et al. (2006)
(SR96)	$\mathrm{Cl + HO_2 \rightarrow ClO + HO}$	$6.30 \times 10^{-11}\exp(-570/T)$	2	Atkinson et al. (2006)
(SR97)	$\mathrm{Cl + H_2O_2 \rightarrow HCl + HO_2}$	$1.10 \times 10^{-11}\exp(-980/T)$	2	Atkinson et al. (2006)
(SR98)	$\mathrm{Cl + O_3 \rightarrow ClO + O_2}$	$2.80 \times 10^{-11}\exp(-250/T)$	2	Atkinson et al. (2006)
(SR99)	$\mathrm{Cl + CH_4 \rightarrow HCl + CH_3O_2}$	$6.60 \times 10^{-12}\exp(-1240/T)$	2	Atkinson et al. (2006)
(SR100)	$\mathrm{Cl + C_2H_2 \rightarrow 2CO + 2HO_2 + Cl}$	2.00×10^{-11}	2	Borken (1996)
(SR101)	$\mathrm{Cl + C_2H_2 \rightarrow 2CO + HO_2 + HCl}$	4.24×10^{-11}	2	Borken (1996)
(SR102)	$\mathrm{Cl + C_2H_4(+M) \rightarrow 2CO + 2HO_2 + Cl + H_2O(+M)}$	$k_0 = 0.59 \times 10^{-29}(T/300)^{-3.3}[\mathrm{air}]$ $k_\infty = 6.00 \times 10^{-10}$ $F_c = 0.40$	2	Atkinson et al. (2006)
(SR103)	$\mathrm{Cl + C_2H_4(+M) \rightarrow 2CO + HO_2 + HCl + H_2O(+M)}$	$k_0 = 1.26 \times 10^{-29}(T/300)^{-3.3}[\mathrm{air}]$ $k_\infty = 6.00 \times 10^{-10}$ $F_c = 0.40$	2	Atkinson et al. (2006)
(SR104)	$\mathrm{Cl + C_2H_6 \rightarrow C_2H_5 + HCl}$	$8.30 \times 10^{-11}\exp(-100/T)$	2	Atkinson et al. (2006)
(SR105)	$\mathrm{Cl + C_3H_8 \rightarrow C_2H_5O_2 + HCl + H_2O + CO_2}$	1.40×10^{-10}	2	Atkinson et al. (2006)
(SR106)	$\mathrm{Cl + HCHO \rightarrow HCl + CO + HO_2}$	$8.10 \times 10^{-11}\exp(-34/T)$	2	Atkinson et al. (2006)
(SR107)	$\mathrm{Cl + CH_3CHO \rightarrow CH_3CO_3 + HCl}$	8.00×10^{-11}	2	Atkinson et al. (2006)
(SR108)	$\mathrm{OH + Cl_2 \rightarrow HOCl + Cl}$	$3.60 \times 10^{-12}\exp(-1200/T)$	2	Atkinson et al. (2006)
(SR109)	$\mathrm{OH + HCl \rightarrow Cl + H_2O}$	$1.80 \times 10^{-12}\exp(-240/T)$	2	Atkinson et al. (2006)

Table S2. (continued).

Reaction Number	Reaction	k $[(\text{molec. cm}^{-3})^{1-n}\text{s}^{-1}]$	Order n	Reference
(SR110)	$\mathrm{OH + HOCl \rightarrow ClO + H_2O}$	5.00×10^{-13}	2	Atkinson et al. (2006)
(SR111)	$\mathrm{OH + ClO \rightarrow Cl + HO_2}$	$6.86 \times 10^{-12}\exp(300/T)$	2	Atkinson et al. (2006)
(SR112)	$\mathrm{OH + ClO \rightarrow HCl + O_2}$	$4.37 \times 10^{-13}\exp(300/T)$	2	Atkinson et al. (2006)
(SR113)	$\mathrm{ClO + ClO \rightarrow Cl_2 + O_2}$	$1.00 \times 10^{-12}\exp(-1590/T)$	2	Atkinson et al. (2006)
(SR114)	$\mathrm{ClO + ClO \rightarrow 2Cl + O_2}$	$3.00 \times 10^{-11}\exp(-2450/T)$	2	Atkinson et al. (2006)
(SR115)	$\mathrm{ClO + ClO \rightarrow Cl + OClO}$	$3.50 \times 10^{-13}\exp(-1370/T)$	2	Atkinson et al. (2006)
(SR116)	$\mathrm{ClO + ClO(+M) \rightarrow Cl_2O_2(+M)}$	$k_0 = 2.00 \times 10^{-32}(T/300)^{-4}[\mathrm{N_2}]$ $k_\infty = 1.00 \times 10^{-11}$ $F_c = 0.45$	2	Atkinson et al. (2006)
(SR117)	$\mathrm{Cl_2O_2(+M) \rightarrow 2ClO(+M)}$	$k_0 = 3.70 \times 10^{-7}\exp(-7690/T)[\mathrm{N_2}]$ $k_\infty = 1.80 \times 10^{14}\exp(-7690/T)$ $F_c = 0.45$	1	Atkinson et al. (2006)
(SR118)	$\mathrm{ClO + HO_2 \rightarrow HOCl + O_2}$	$2.20 \times 10^{-12}\exp(340/T)$	2	Atkinson et al. (2006)
(SR119)	$\mathrm{ClO + CH_3O_2 \rightarrow Cl + CH_2O + HO_2}$	$2.40 \times 10^{-12}\exp(-20/T)$	2	Atkinson et al. (2006)
(SR120)	$\mathrm{ClO + NO \rightarrow Cl + NO_2}$	$6.20 \times 10^{-12}\exp(295/T)$	2	Atkinson et al. (2006)
(SR121)	$\mathrm{ClO + NO_2(+M) \rightarrow ClONO_2(+M)}$	$k_0 = 1.60 \times 10^{-31}(T/300)^{-3.4}[\mathrm{N_2}]$ $k_\infty = 7.00 \times 10^{-11}$ $F_c = 0.40$	2	Atkinson et al. (2006)
(SR122)	$\mathrm{Cl + ClONO_2 \rightarrow Cl_2 + NO_3}$	$6.20 \times 10^{-12}\exp(145/T)$	2	Atkinson et al. (2006)
(SR123)	$\mathrm{OClO + NO \rightarrow NO_2 + ClO}$	$1.10 \times 10^{-13}\exp(350/T)$	2	Atkinson et al. (2006)
(SR124)	$\mathrm{OH + ClONO_2 \rightarrow HOCl + NO_3}$	$1.20 \times 10^{-12}\exp(-330/T)$	2	Atkinson et al. (2006)
(SR125)	$\mathrm{ClO + BrO \rightarrow Br + OClO}$	$1.60 \times 10^{-12}\exp(430/T)$	2	Atkinson et al. (2006)
(SR126)	$\mathrm{ClO + BrO \rightarrow Br + Cl + O_2}$	$2.90 \times 10^{-12}\exp(220/T)$	2	Atkinson et al. (2006)
(SR127)	$\mathrm{ClO + BrO \rightarrow BrCl + O_2}$	$5.80 \times 10^{-13}\exp(170/T)$	2	Atkinson et al. (2006)
(SR128)	$\mathrm{Br + OClO \rightarrow BrO + ClO}$	$2.70 \times 10^{-11}\exp(-1300/T)$	2	Atkinson et al. (2006)
(SR129)	$\mathrm{Br + Cl_2O_2 \rightarrow BrCl + ClOO}$	3.00×10^{-12}	2	Atkinson et al. (2006)
(SR130)	$\mathrm{Br_2 + Cl \rightarrow BrCl + Br}$	1.20×10^{-10}	2	Sander and Crutzen (1996)
(SR131)	$\mathrm{BrCl + Br \rightarrow Br_2 + Cl}$	3.30×10^{-15}	2	Sander and Crutzen (1996)
(SR132)	$\mathrm{Br + Cl_2 \rightarrow BrCl + Cl}$	1.10×10^{-15}	2	Sander and Crutzen (1996)
(SR133)	$\mathrm{BrCl + Cl \rightarrow Br + Cl_2}$	1.50×10^{-11}	2	Sander and Crutzen (1996)
(SR134)	$\mathrm{HOBr + H^+ + Cl^- \xrightarrow{ice} BrCl + H_2O}$	3.03×10^{-5}	$(r_a + r_b + r_c)^{-1}\alpha_{\mathrm{eff,ice}}$	Cao et al. (2014)
(SR135)	$\mathrm{BrCl} + h\nu \rightarrow \mathrm{Br + Cl}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR136)	$\mathrm{Cl_2} + h\nu \rightarrow \mathrm{Cl}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR137)	$\mathrm{ClO} + h\nu \rightarrow \mathrm{Cl + O_3}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR138)	$\mathrm{HOCl} + h\nu \rightarrow \mathrm{HO + Cl}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR139)	$\mathrm{ClONO_2} + h\nu \rightarrow \mathrm{NO_3 + Cl}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR140)	$\mathrm{OClO} + h\nu \rightarrow \mathrm{O_3 + ClO}$	calculated by TUV model	1	Madronich and Flocke (1997, 1999)
(SR141)	$\mathrm{HOBr + HCl \xrightarrow{aerosol} BrCl + H_2O}$	$(\frac{r}{D_\mathrm{g}} + \frac{4}{v_{\mathrm{therm}}\gamma})^{-1}\alpha_{\mathrm{eff,aerosol}}$		Cao et al. (2014)

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