S1 Upper tropospheric distribution

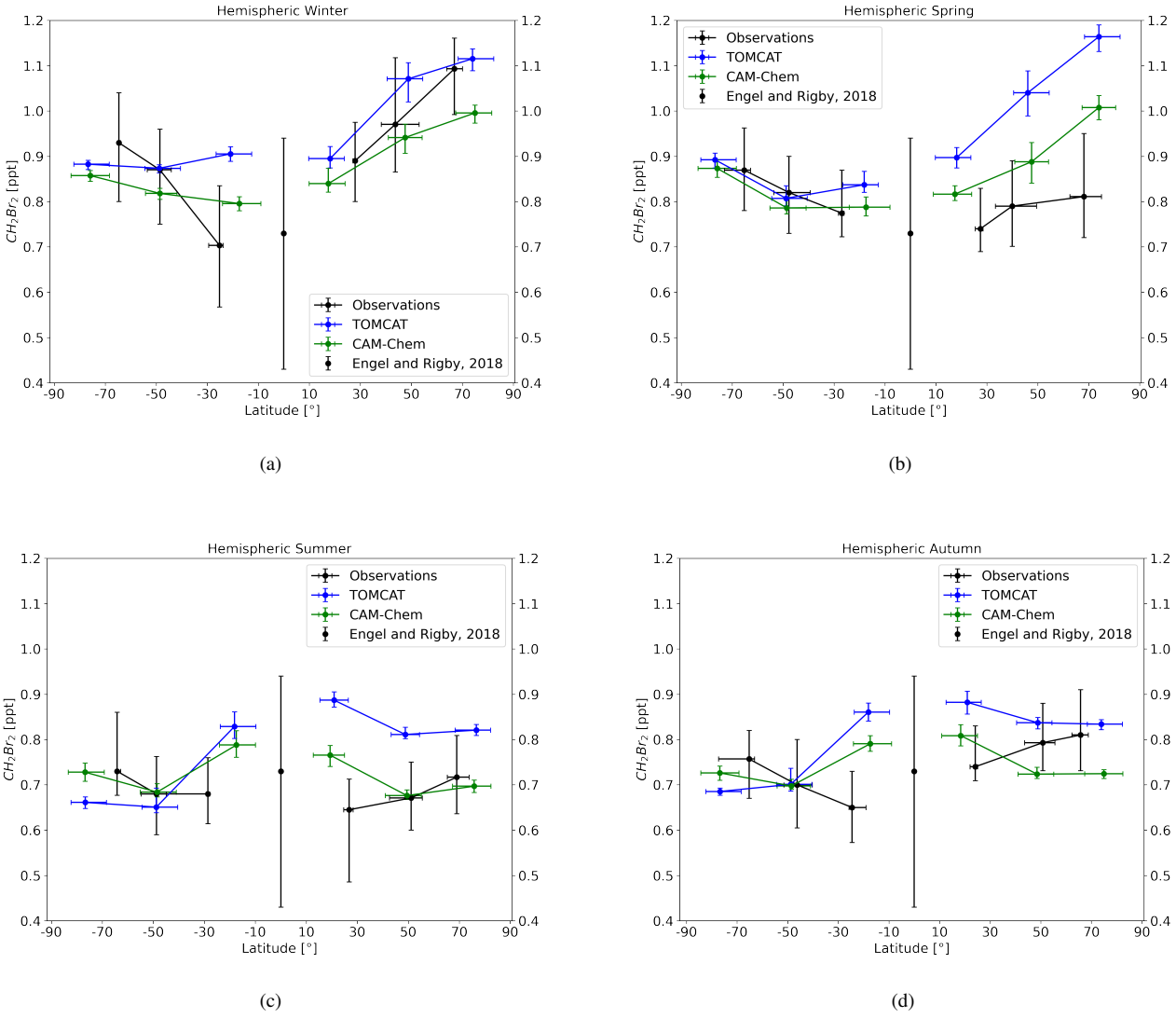
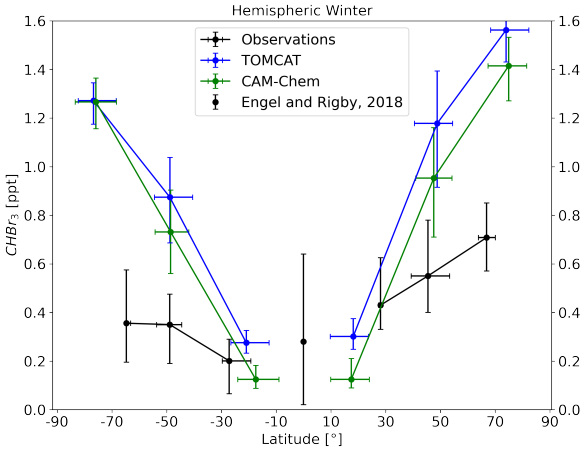
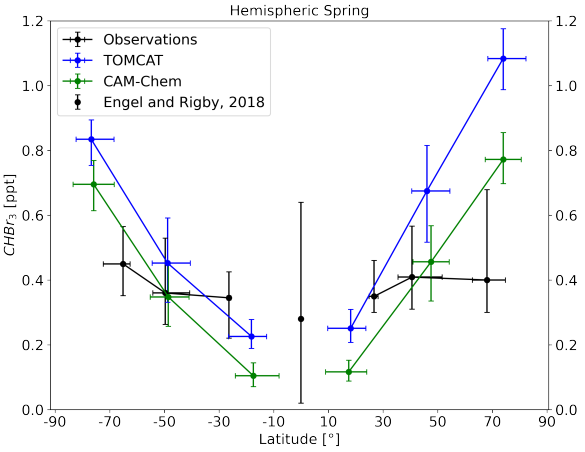


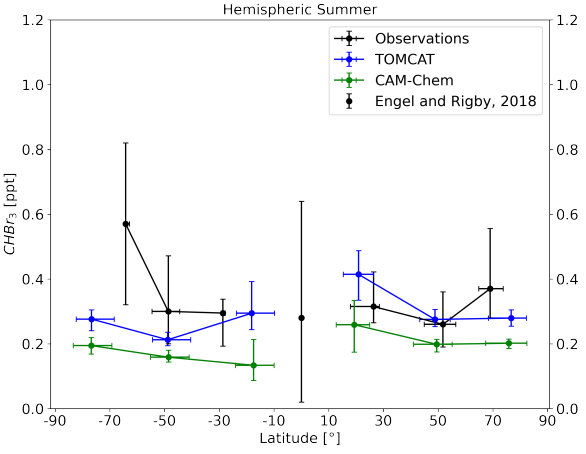
Figure S1. Latitude cross section of tropopause representative mixing ratios of CH_2Br_2 using all observation and model results for both hemispheres in (a) winter, (b) spring, (c) summer, and (d) autumn. Data are binned into three latitude bins for each hemisphere: high latitudes (90°–60°), mid latitudes (60°–30°), and low latitudes (30°–0°) and only for data within the 10 K below the dynamical tropopause. Latitudinal position of observational and model bins may differ due to different spatial data coverage of observations and models. Also included are the reference mixing ratios for the tropical tropopause (Engel and Rigby, 2018)



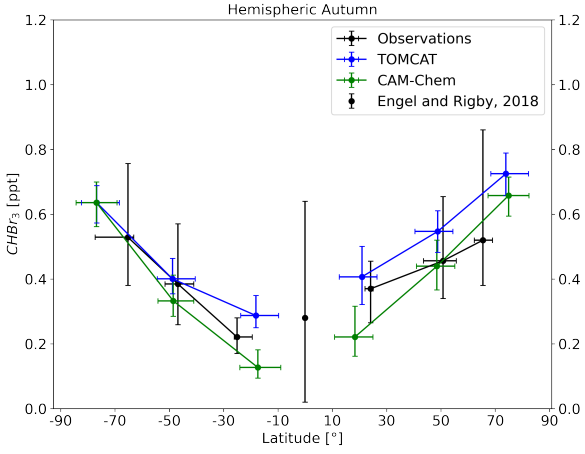
(a)



(b)



(c)



(d)

Figure S2. As in Figure S1 but for $CHBr_3$.

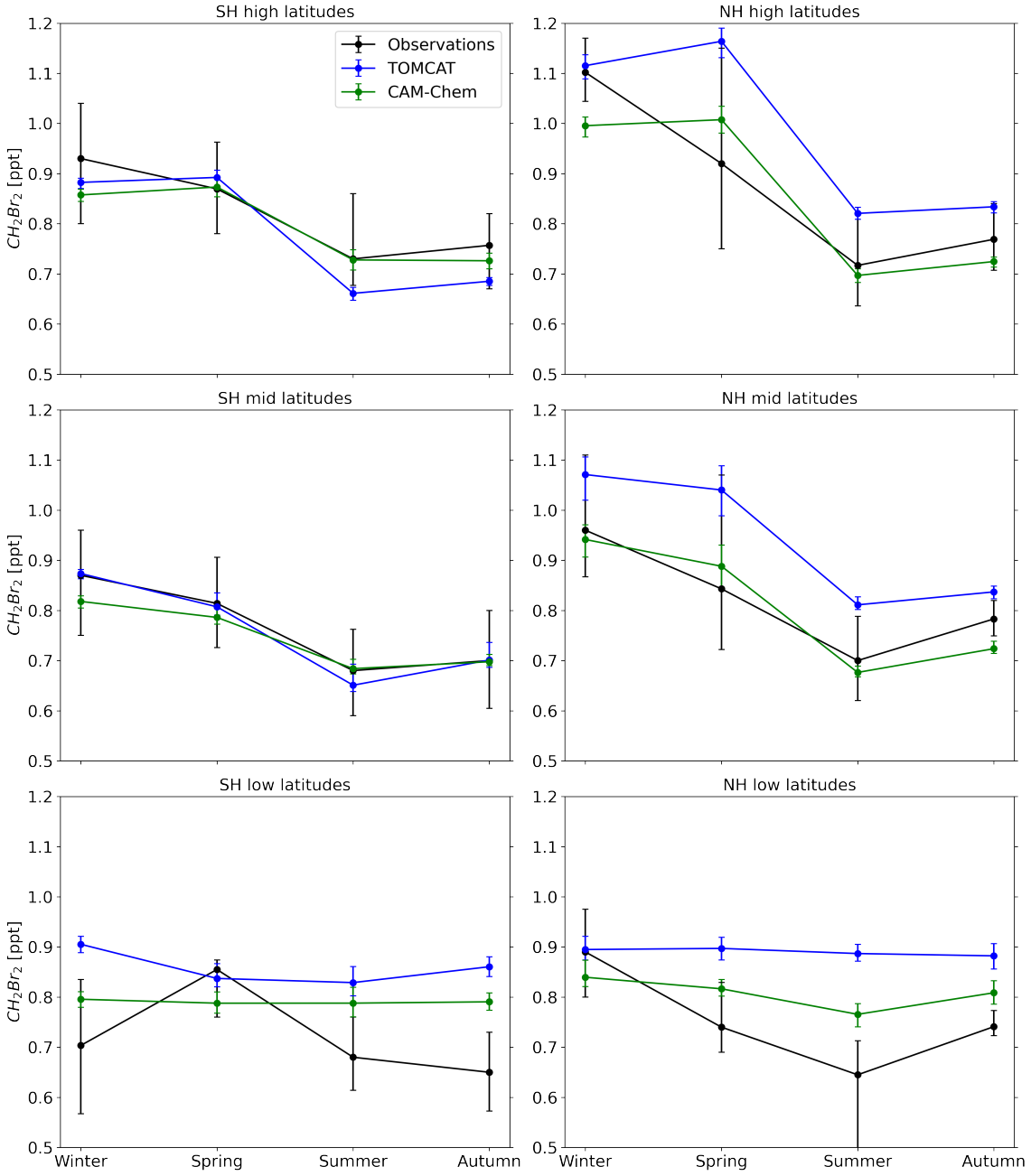


Figure S3. Seasonal cycle of CH_2Br_2 for the three latitudinal bands: high latitudes (90°–60°), mid latitudes (60°–30°), and low latitudes (30°–0°) and only for data within the 10 K below the dynamical tropopause. Observations are presented in black and model results of TOMCAT and CAM-Chem in blue and green, respectively.

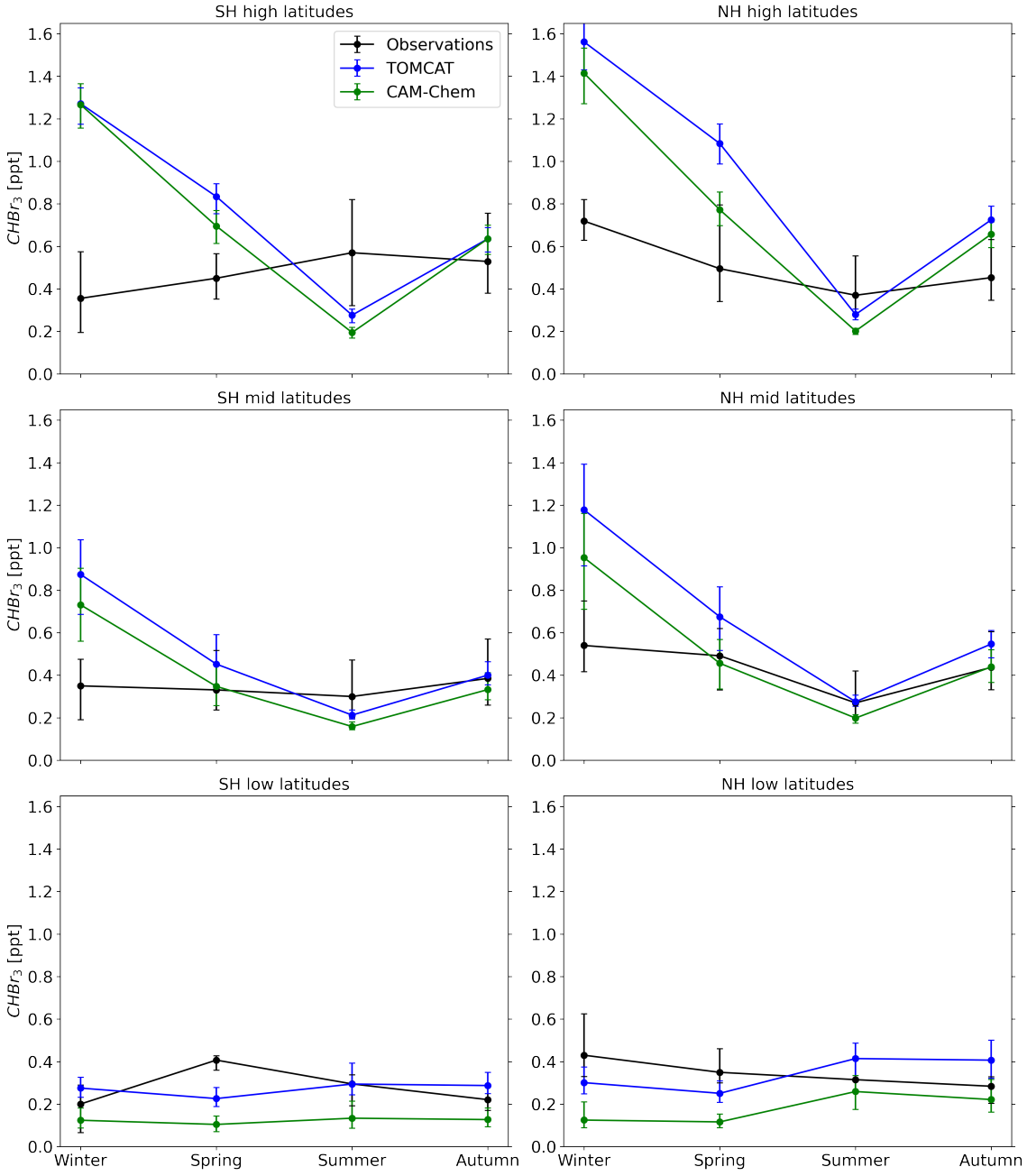


Figure S4. As in Figure S3, but for $CHBr_3$.

Table S1. Number of observations of CH_2Br_2 and $CHBr_3$ at high latitudes (60°-90°), mid latitudes (30°-60°) and low latitudes (0°-30°) in the upper troposphere, e.g. within 10 K below the local dynamical tropopause for the Northern and Southern Hemisphere.

	Southern Hemisphere			Northern Hemisphere		
CH_2Br_2	high lat.	mid lat.	low lat.	low lat.	mid lat.	high lat.
Winter	61	222	28	51	306	207
Spring	128	401	42	64	286	182
Summer	41	172	19	42	273	265
Autumn	130	292	35	67	270	238
$CHBr_3$						
Winter	50	182	14	43	278	207
Spring	107	289	26	52	263	171
Summer	39	155	18	6	186	215
Autumn	129	174	29	67	251	233

Table S2. Median absolute percentage differences (%) of to the respective model to the observational mid latitude vertical profiles (40° - 60° eq. lat*) in hemispheric spring and autumn. Vertical profiles from 10 K below the dynamic tropopause to the lowermot stratosphere (if not additionally marked otherwise).

		Spring		Autumn	
		SH	NH	SH	NH
CH_2Br_2	TOMCAT	18	26	25[a]	20
	CAM-Chem	9	17	15[a]	6
$CHBr_3$	TOMCAT	21	69	89[b]	22[b]
	CAM-Chem	26	15	65[b]	26[b]

[a] between 0-40 K of $\Delta\Theta$
[b] between -10-40 K of $\Delta\Theta$