Supplementary information to

Southern hemispheric halon trends and global halon emissions, 1978 – 2011

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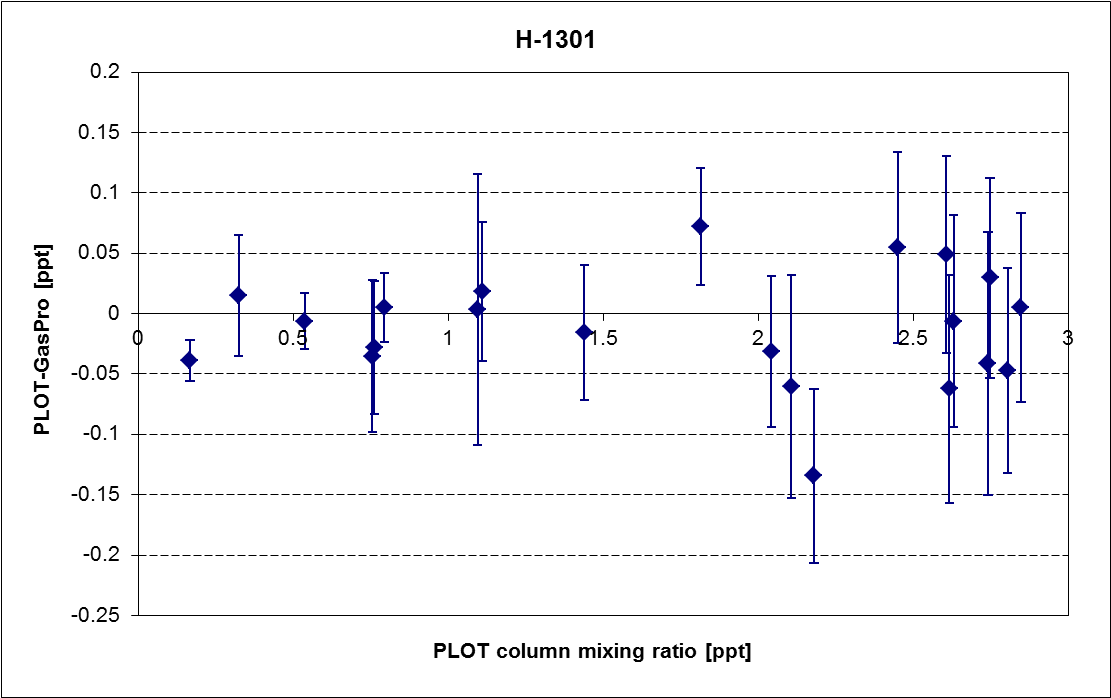
As discussed in the manuscript, the analysis of the Cape Grim air samples was performed using two different experimental configurations. All samples collected between 1978 and 2004 were analysed with a V.G./Micromass Autospec GC-MS utilising various KCl-passivated alumina-PLOT (Al-PLOT) capillary columns as described by Fraser et al. (1999). In 2006 the mass spectrometer was updated to an Autospec Premier (Waters/Micromass) and the Al-PLOT capillary column (50m x 0.53 mm) was replaced by a GasPro column (30m x 0.32 mm) supplied by Agilent. This new system, and the slight modification to the sample pre-concentration procedure, are described in Laube et al. (2010) and Oram et al. (2012). All Cape Grim samples collected after 2005 have been analysed with this new experimental set-up.

In order to assess the comparability of the two datasets a number of samples (21) collected during the period 1978 – 2004 and analysed with the original instrument and columns were reanalysed on the GasPro/Autospec Premier system. Figures S1 – S4 show the difference between the mixing ratios derived from the two configurations plotted against the mixing ratio derived from the Al-PLOT/Autospec combination (note that not all halons were analysed in all 21 samples). For H-1301 (S1) and H-1202 (S4) there are no systematic differences over the entire 33 year record, suggesting that the two datasets can be combined to form one consistent record. For H-1211 (S2) and H-2402 (S3) there were small, but significant, deviations at lower concentrations (pre-1989). These apparently non-linear data measured with the original setup are not presented in the paper and have been excluded from Figures S1 – S4. The remaining data show that there is a good agreement between the two systems and that the H-1211 and H-2402 data can be combined to form one consistent record.

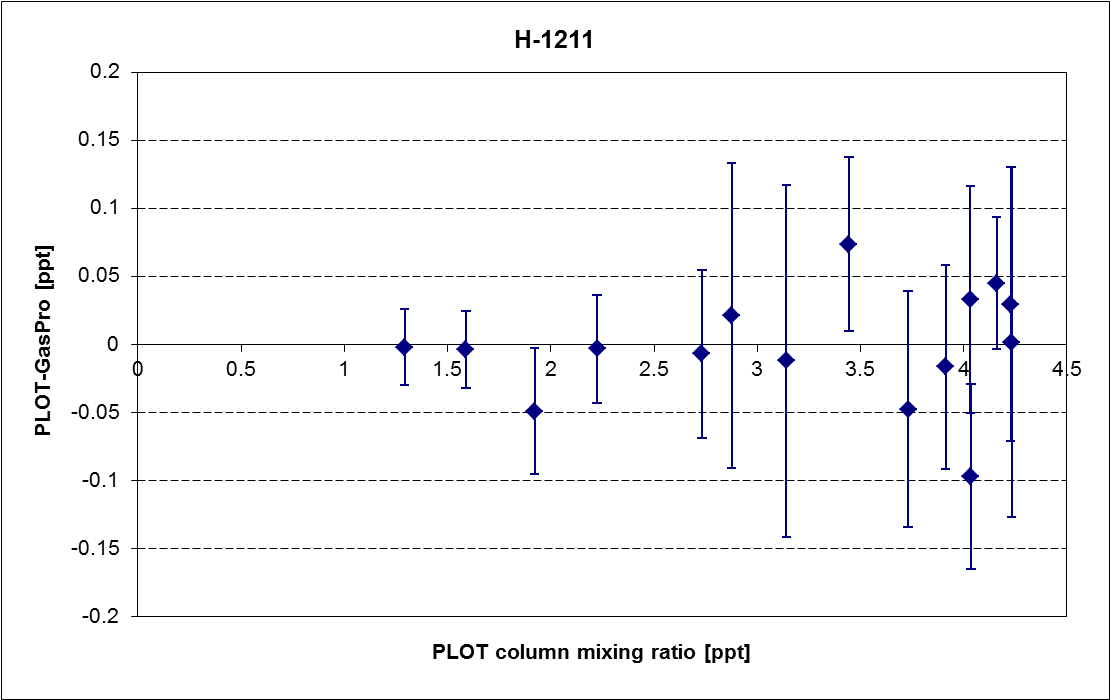
A small subset of samples (7) collected prior to 1994, originally analysed using an Al-PLOT column supplied by Chrompak, were reanalysed on a different Al-PLOT column (Agilent) in 2004. These measurements fit with the other GasPro-derived data, suggesting that this datasets can also be combined to form one consistent record.

Table S1 shows the model fit trends at Cape Grim inferred from measurements from 1978 – 2011 (see Figure 1). Table S2 displays the measured mixing ratios at Cape Grim from 1978 – 2011 (see Figure 1). Table S3 shows the annual global emissions of the halons from 1978 – 2010 derived from the Cape Grim measurements using the lifetimes reported by Montzka and Reimann (2011) (see Figure 2). Table S4 shows the annual global emissions of the halons from 1978 – 2010 derived from the Cape Grim measurements using the alternative lifetimes reported in this work (See Section 8).

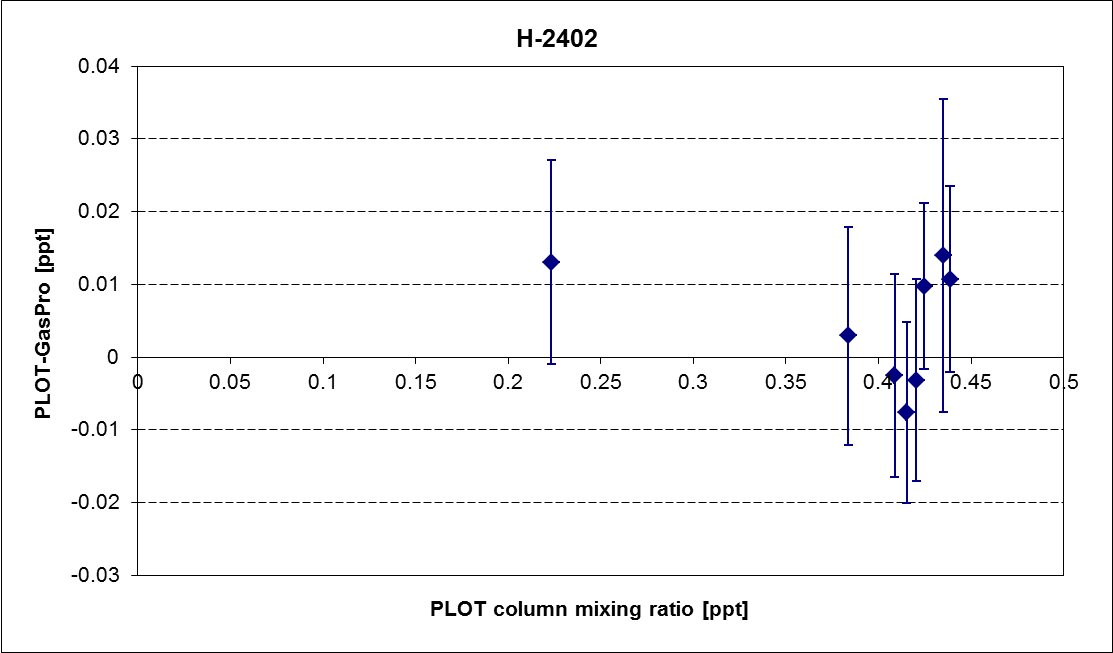
Tables S1 – S4 are presented in a separate spreadsheet.

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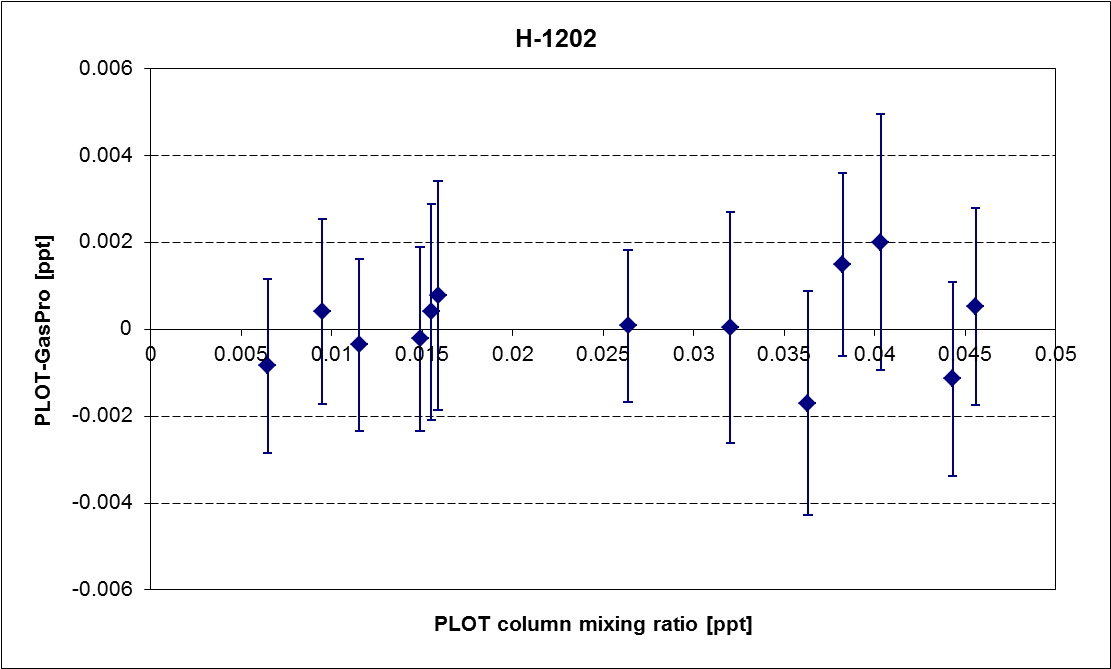
**Figure S1**



**Figure S2**



**Figure S3**



**Figure S4**

**Figures S1-S4.** Differences in mixing ratio (in ppt) as measured by two different analytical systems: Al-PLOT/Autospec and GasPro/Autospec-Premier. The differences are plotted as Al-PLOT/Autospec mixing ratios minus GasPro/Autospec-Premier mixing ratios against the mixing ratio derived from the Al-PLOT/Autospec. The samples analysed were collected at Cape Grim at various times: (S1) H-1301, 21 samples covering the period 1978 – 2004; (S2) H-1211, 15 samples, 1985 – 2004; (S3) H-2402, 8 samples, 1985 – 2004; (S4) H-1202, 13 samples, 1978 – 2004. Note that (i) H-1211 and H-2402 data from samples analysed with a faulty Al-PLOT column have been excluded, and (ii) all four halons were not always monitored in the 21 samples reanalysed. The vertical error bars represent the 1-sigma measurement uncertainty.