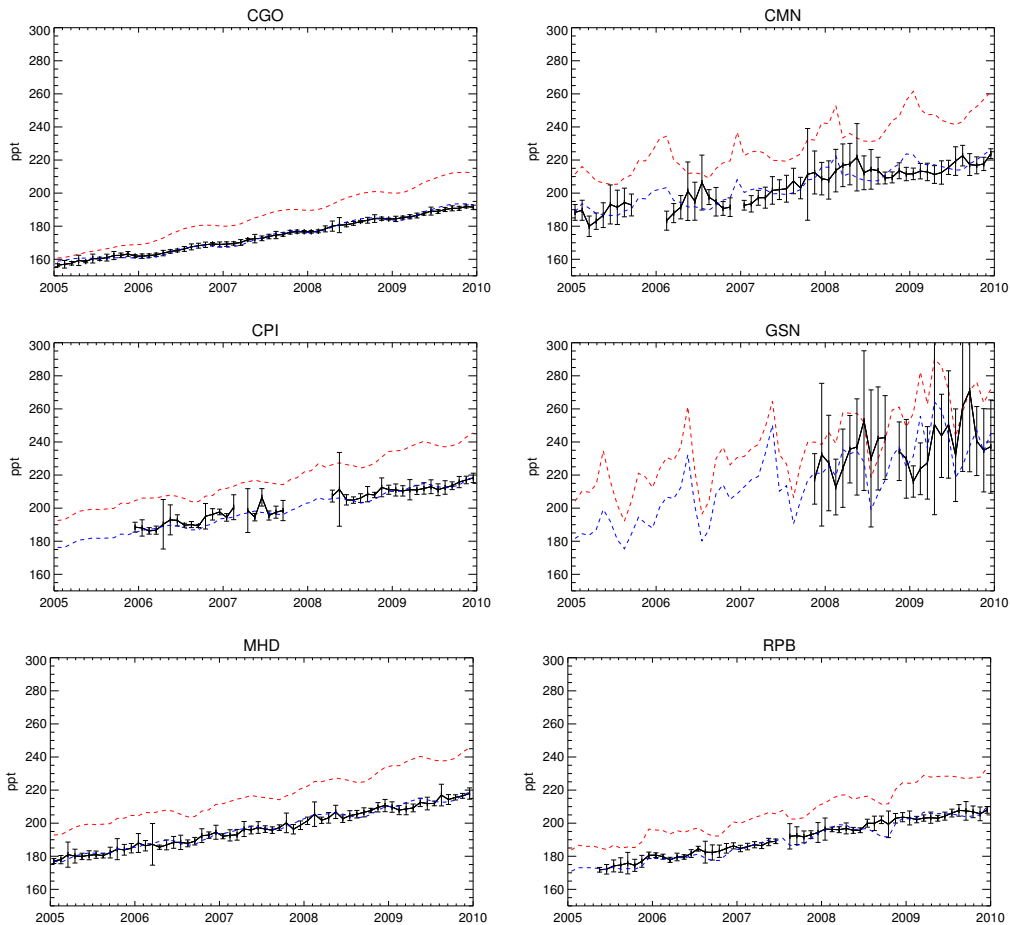
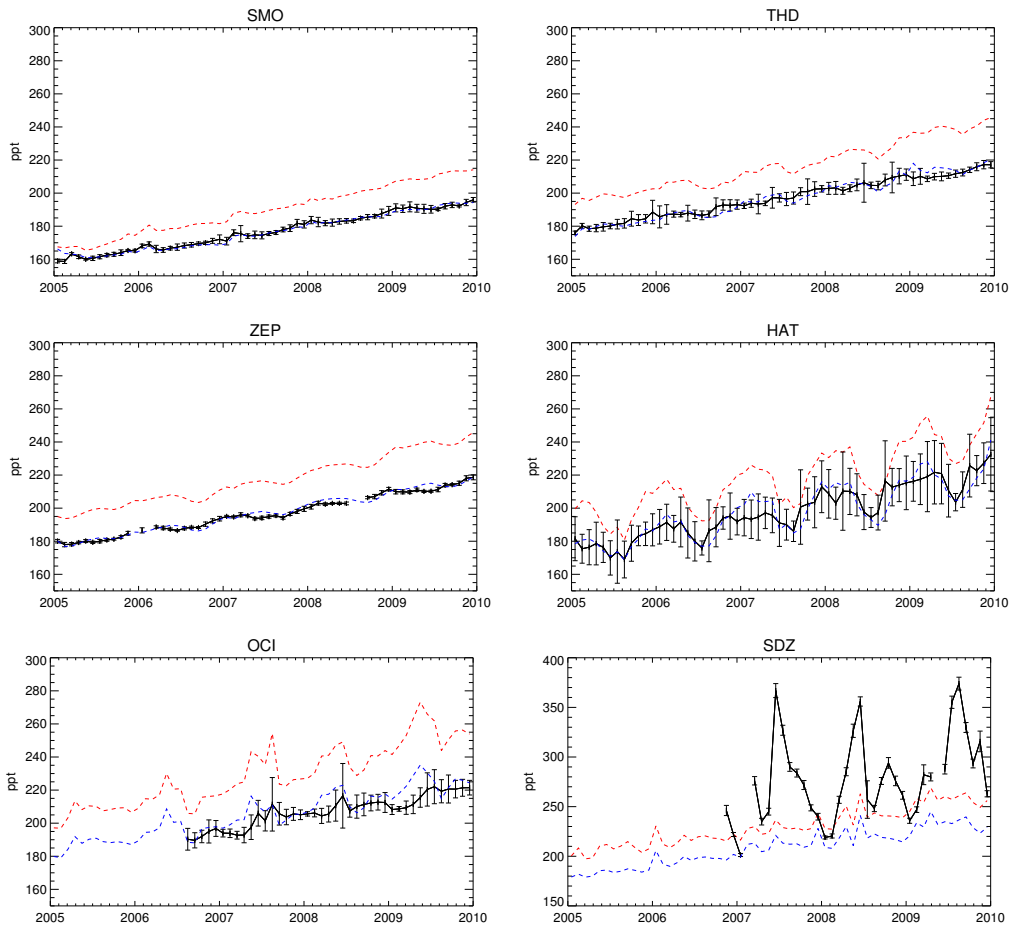


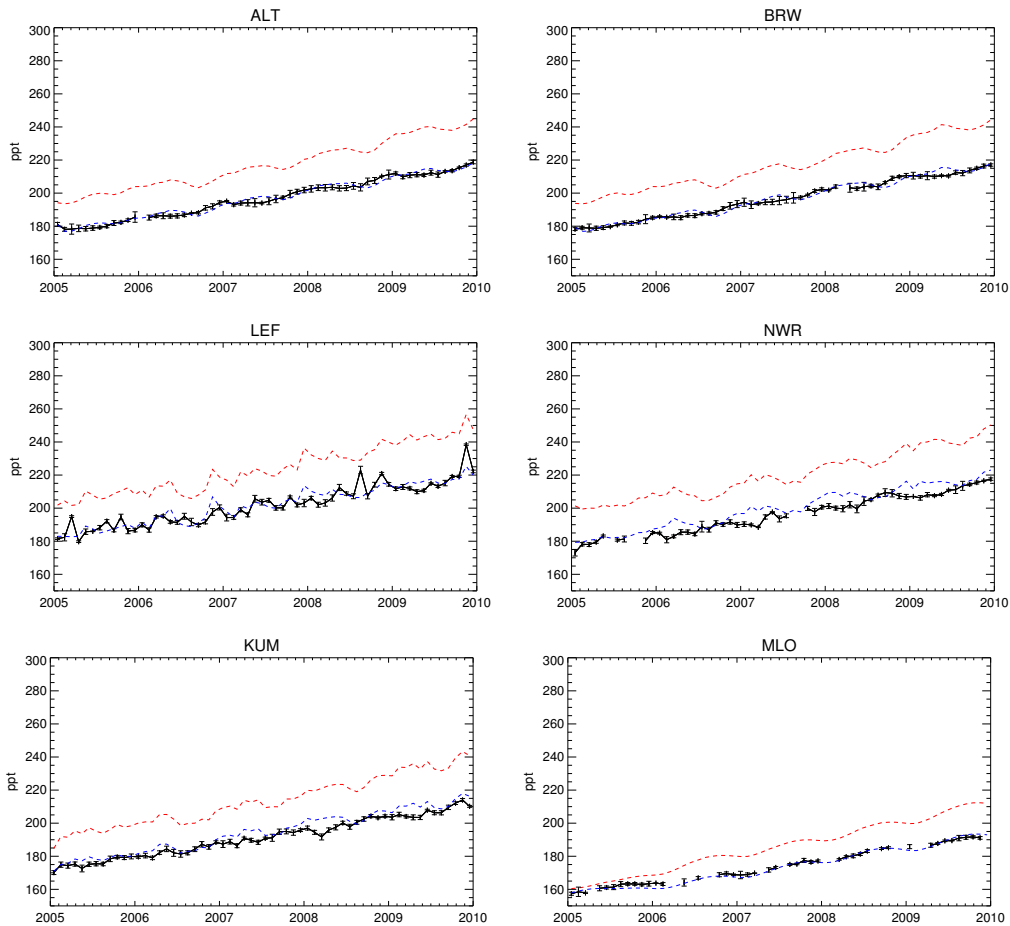
**Fig. S1.** Global total HCFC-22 emissions derived using measurements including pollution events. Prior emission estimates using EDGAR v4, the growth rate between 1990 - 2000 (McCulloch et al., 2003), and HCFC-22 consumption between 2001 - 2009 (UNEP, 2011) are shown in diamonds. Polynomial fit of these “raw” prior values that we used in our global inversion are shown as a red line with a shaded (pink) 40% uncertainty range. Optimized emissions from this study are shown in blue with our calculated posterior uncertainty. Previously published bank emission estimates (blue crosses) (IPCC/TEAP, 2005; UNEP, 2007), “bottom-up” emission estimates (green stars) (UNEP/TEAP, 2006), 1-box model emission estimates (Montzka et al., 2009), as well as new AGAGE 12-box model emission estimates are also shown for comparison.



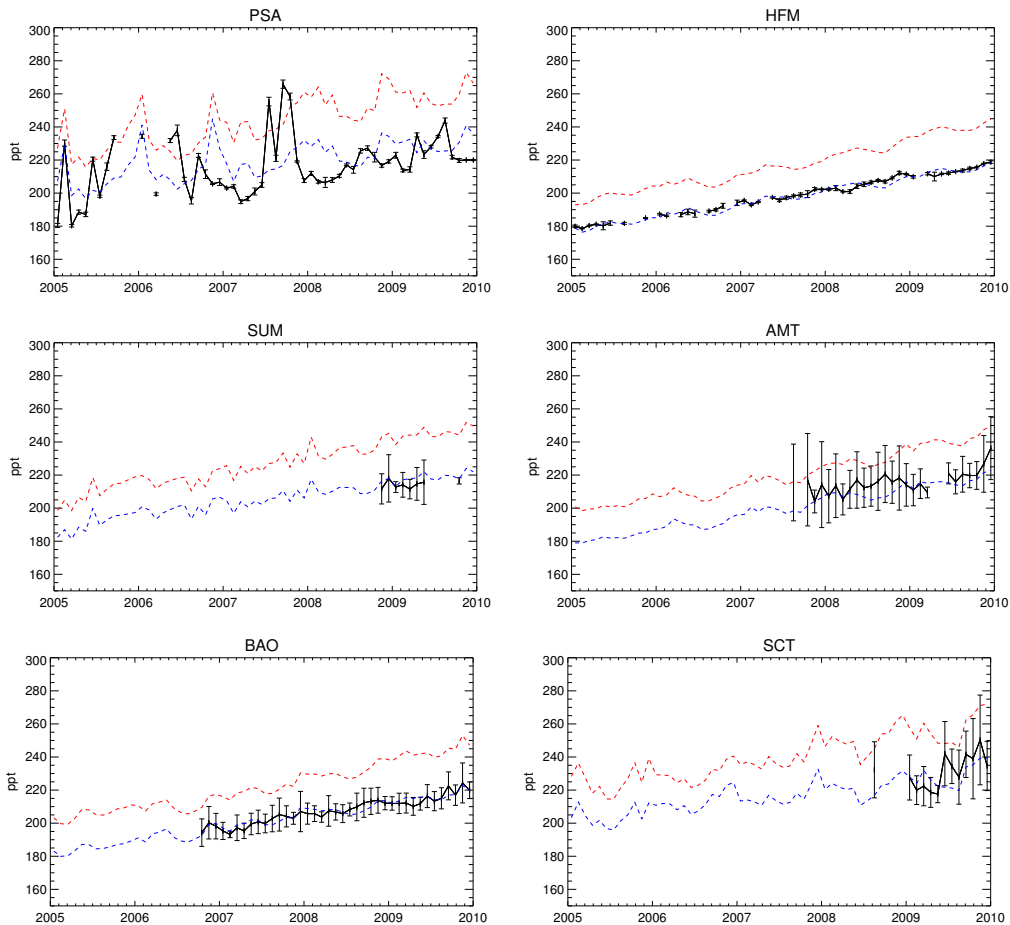
**Fig. S2a.** Monthly atmospheric mole fractions: measurements (black solid lines with standard deviations), and MOZART v4 model results using prior emissions (red dash lines) and optimized emissions (blue dash lines).



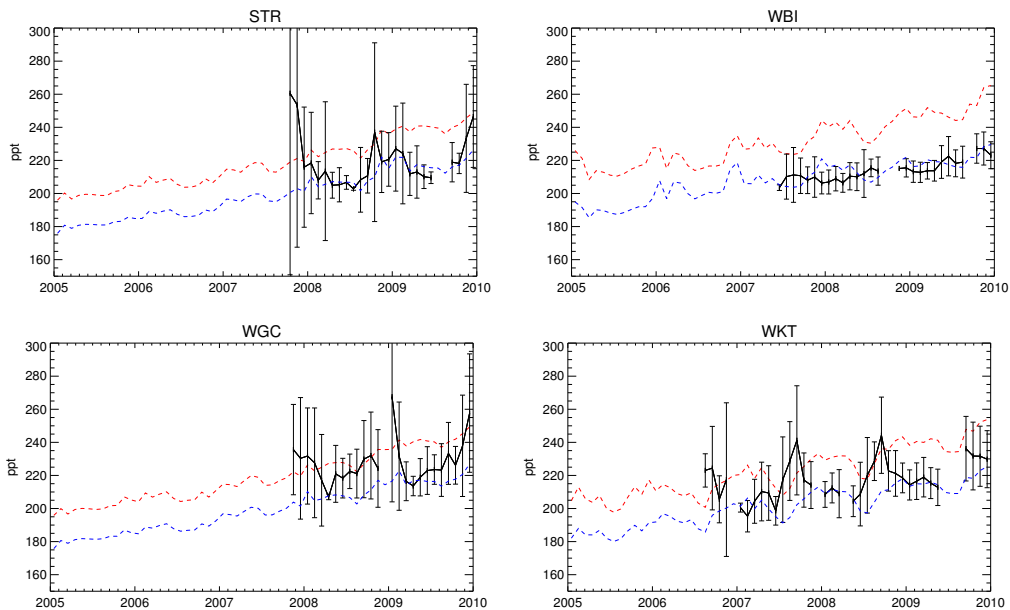
**Fig. S2b.** Monthly atmospheric mole fractions: measurements (black solid lines with standard deviations), and MOZART v4 model results using prior emissions (red dash lines) and optimized emissions (blue dash lines).



**Fig. S2c.** Monthly atmospheric mole fractions: measurements (black solid lines with standard deviations), and MOZART v4 model results using prior emissions (red dash lines) and optimized emissions (blue dash lines).



**Fig. S2d.** Monthly atmospheric mole fractions: measurements (black solid lines with standard deviations), and MOZART v4 model results using prior emissions (red dash lines) and optimized emissions (blue dash lines).



**Fig. S2e.** Monthly atmospheric mole fractions: measurements (black solid lines with standard deviations), and MOZART v4 model results using prior emissions (red dash lines) and optimized emissions (blue dash lines).

**Table S1.** Root-mean-square deviations of the differences between measurements and modeled mixing ratios. The first column shows the model results using prior emissions and the second column shows the same with posterior emissions.

<b>Station</b>	<b>prior mixing ratio RMSD</b>	<b>posterior mixing ratio RMSD</b>
<i>Global inversion</i>		
CGO	80.4	30.7
MHD	151.9	39.2
RPB	68.6	24.5
SMO	88.5	24.0
THD	101.5	22.2
ZEP	112.5	20.6
<i>Regional inversion</i>		
CGO	104.1	10.6
CMN	203.8	50.7
CPI	129.7	20.1
GSN	136.2	90.7
MHD	160.9	15.6
RPB	125.8	22.8
SMO	106.1	12.8
THD	157.2	22.7
ZEP	158.1	15.2
HAT	167.8	48.7
OCH	205.4	49.3
SDZ	316.4	414.0
ALT	159.3	15.4
BRW	159.6	15.9
LEF	175.8	37.0
NWR	188.1	42.0
KUM	174.4	32.1
MLO	83.4	9.74
PSA	255.0	135.6
HFM	143.7	15.9
SUM	84.0	11.3
AMT	91.8	39.1
BAO	145.0	16.4
SCT	96.0	36.0
STR	105.0	89.7
WBI	153.9	31.6
WGC	71.5	96.2
WKT	107.1	97.4