

Selected results from trace gas inter-comparisons between AGAGE *in situ* and NOAA flask data



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P.B. Krummel¹, L.P. Steele¹, P.J. Fraser¹, L.W. Porter^{1*}, N. Derek¹, S.A. Montzka², E.J. Dlugokencky², G.S. Dutton², B.D. Hall², J.W. Elkins², B.R. Miller^{2,3}, P.K. Salameh³, J. Mühle³, C. Harth³, R.F. Weiss³, S. O'Doherty⁴, P.G. Simmonds⁴, B.R. Grealley⁴, and R.G. Prinn⁵

¹Centre for Australian Weather & Climate Research/CSIRO Marine & Atmospheric Research, Aspendale, Victoria, Australia

²NOAA Earth System Research Laboratory, Boulder, Colorado, USA

³Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California, USA

⁴School of Chemistry, University of Bristol, Bristol, UK

⁵Department of Earth, Atmospheric and Planetary Sciences, MIT, Cambridge, Massachusetts, USA

*Deceased

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Why perform comparisons?

- Gives us the ability to report relationships between different calibration scales in publications or web pages
- Knowing these relationships enables us to merge or combine data sets from different laboratories/scales for joint studies
- For a given species, enables us to compare measurements from different instruments and/or measurement techniques
- If done regularly, helps in the early identification of problems that may have gone undiagnosed for longer

How the comparisons evolved

- Started with comparisons of CSIRO GASLAB flask data versus AGAGE *in situ* at Cape Grim, specifically CH₄, then N₂O, CO & H₂
- Extended for GASLAB CO₂ flask data vs *in situ* measurements at CG
- Next NOAA CH₄ flask data vs AGAGE *in situ* at the 4 (now 5) common sites, results reported at regular AGAGE science meetings
- Soon after, started inter-comparing about 4 halocarbon species at Cape Grim between NOAA and AGAGE ... the number of species soon multiplied ... and comparisons were extended to the rest of the AGAGE stations ...
- As time went on, more panels were added to output, code improved ...
- As more instruments were developed and deployed, more comparisons were performed
- Recently, with Ken Masarie, performed some comparisons between Carbon Tracker model output and both flask and *in situ* CO₂ at Cape Grim

Species inter-compared to AGAGE *in situ*

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Currently 28 species in total:

CH_4 , N_2O , SF_6 , CO , H_2

CFC-11, CFC-12, CFC-113

HCFC-22, HCFC-141b, HCFC-142b

HFC-134a, HFC-152a

H-1211, H-1301, H-2402

CH_3CCl_3 , CCl_4 , CCl_2CCl_2

CH_3Cl , CHCl_3 , CH_3Br , CH_2Cl_2 , CH_3I , CHBr_3 , CH_2Br_2

C_6H_6 , OCS

Participants in trace gas inter-comparisons to AGAGE

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NOAA/GMD/ESRL CCGG flask - Ed Dlugokencky, 5 sites, 3 species

NOAA/GMD/ESRL HATS flask (GCMS) - Steve Montzka, 4 sites, up to 20 species

NOAA/GMD/ESRL HATS flask (ECD) - Jim Butler/Jim Elkins, 4 sites, up to 8 species

NOAA/GMD/ESRL HATS CATS *in situ* - Geoff Dutton, 1 site (Samoa), 11 species

NIES flask – Yoko Yokouchi, 1 site (Cape Grim), 8 species

Uni. of Heidelberg flask – Ingeborg Levin , 1 site (Cape Grim), 1 species

CSIRO flask – Paul Steele/Ray Langenfelds/Paul Krummel, 1 site (Cape Grim), 4 species

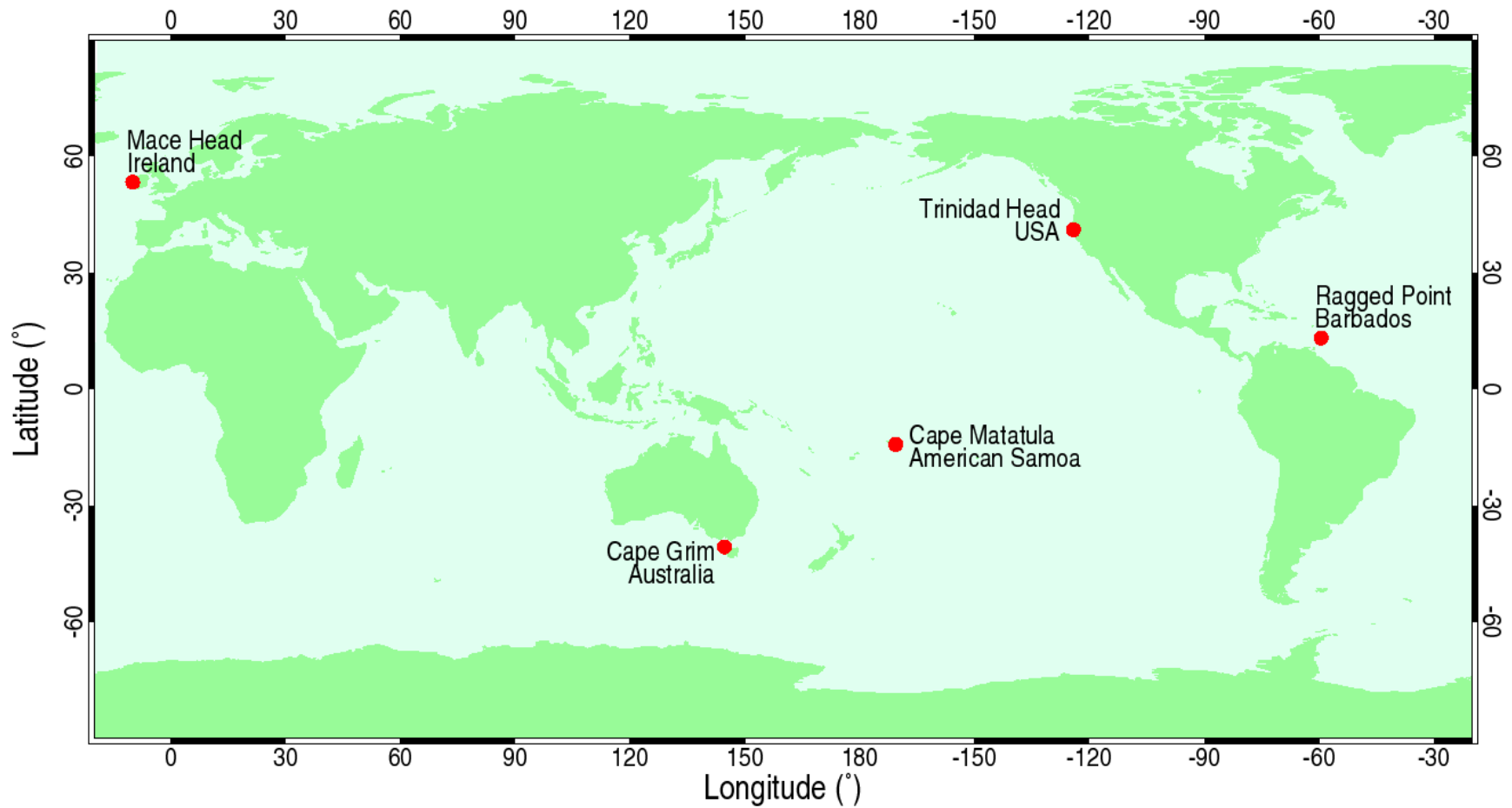
SIO flask – Ben Miller/Martin Vollmer, 1 site (Cape Grim), 5 species

UEA flask – David Oram, 1 site (Cape Grim), 24 species

** A lot of data and ALL different formats!

Comparisons performed approx every 6 months, results made available to all participants, copies archived and form part of the metadata

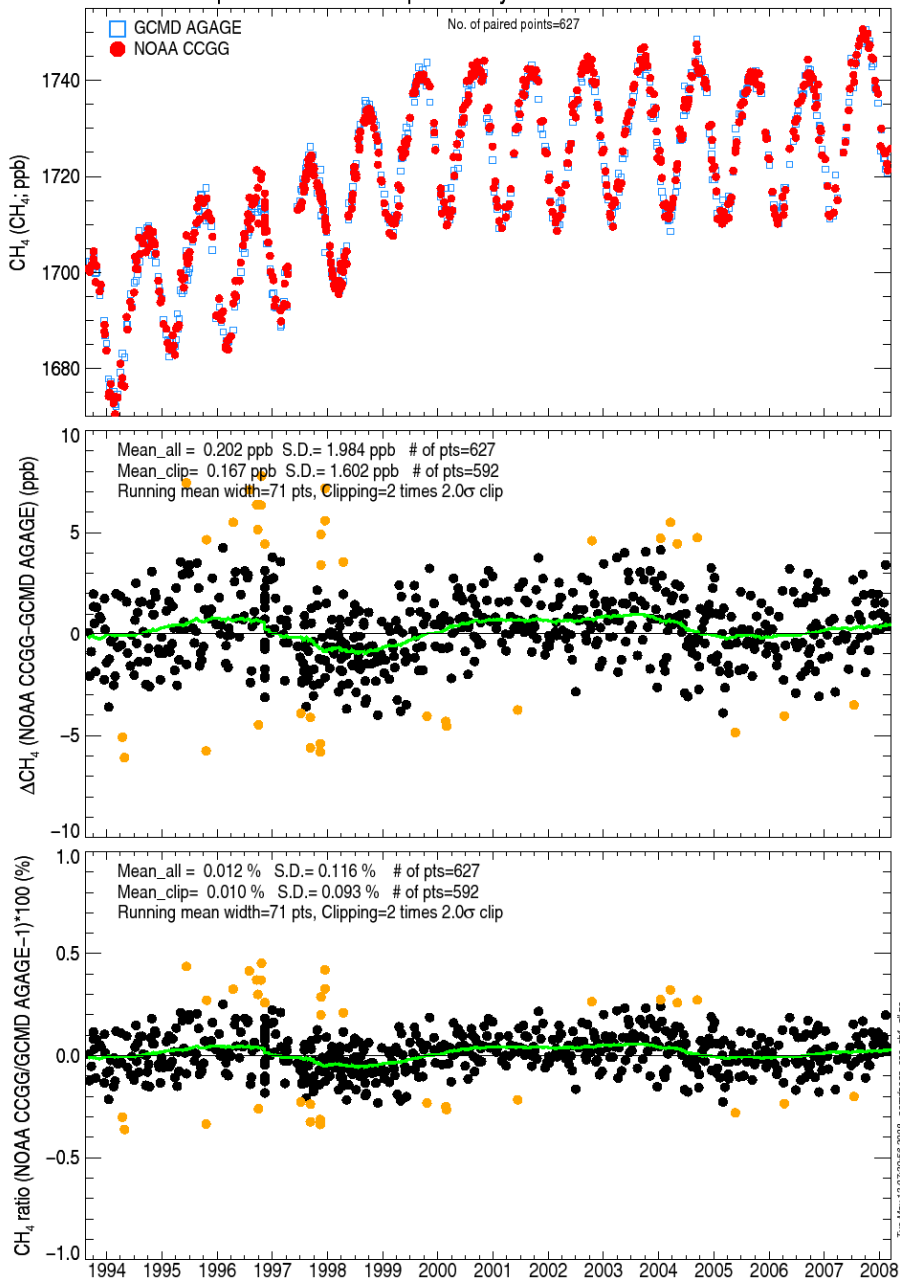
AGAGE sites



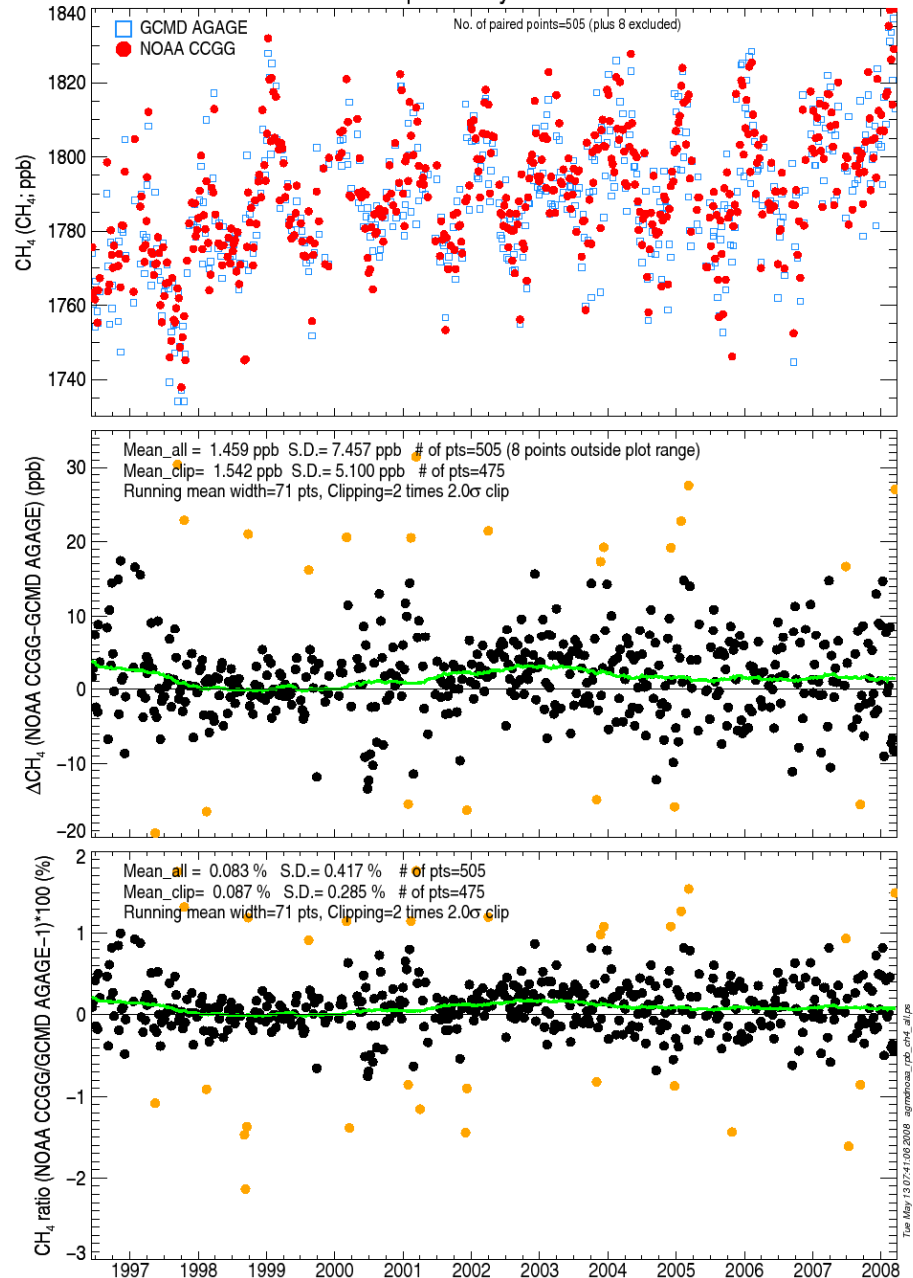
Comparisons

- Controlled by input files
- Matching performed by taking flask sampling time and looking for nearest *in situ* data point within a specified time window
- Full output produces 10 panels:
 - Time series of all data; time series of matched data
 - 1:1 plot; time series of concentration difference
 - conc diff vs flask conc; conc diff vs *in situ* conc
 - Time series of % conc diff; % conc diff vs flask conc
 - conc diff vs matched time diff; conc diff vs abs(matched time diff)
- Files of matched data points produced
- Can plot vertical lines indicating cal/std tank changes for both NOAA & AGAGE; also other options can be customised eg smoothing/clipping
- Currently working on a major overhaul of the code

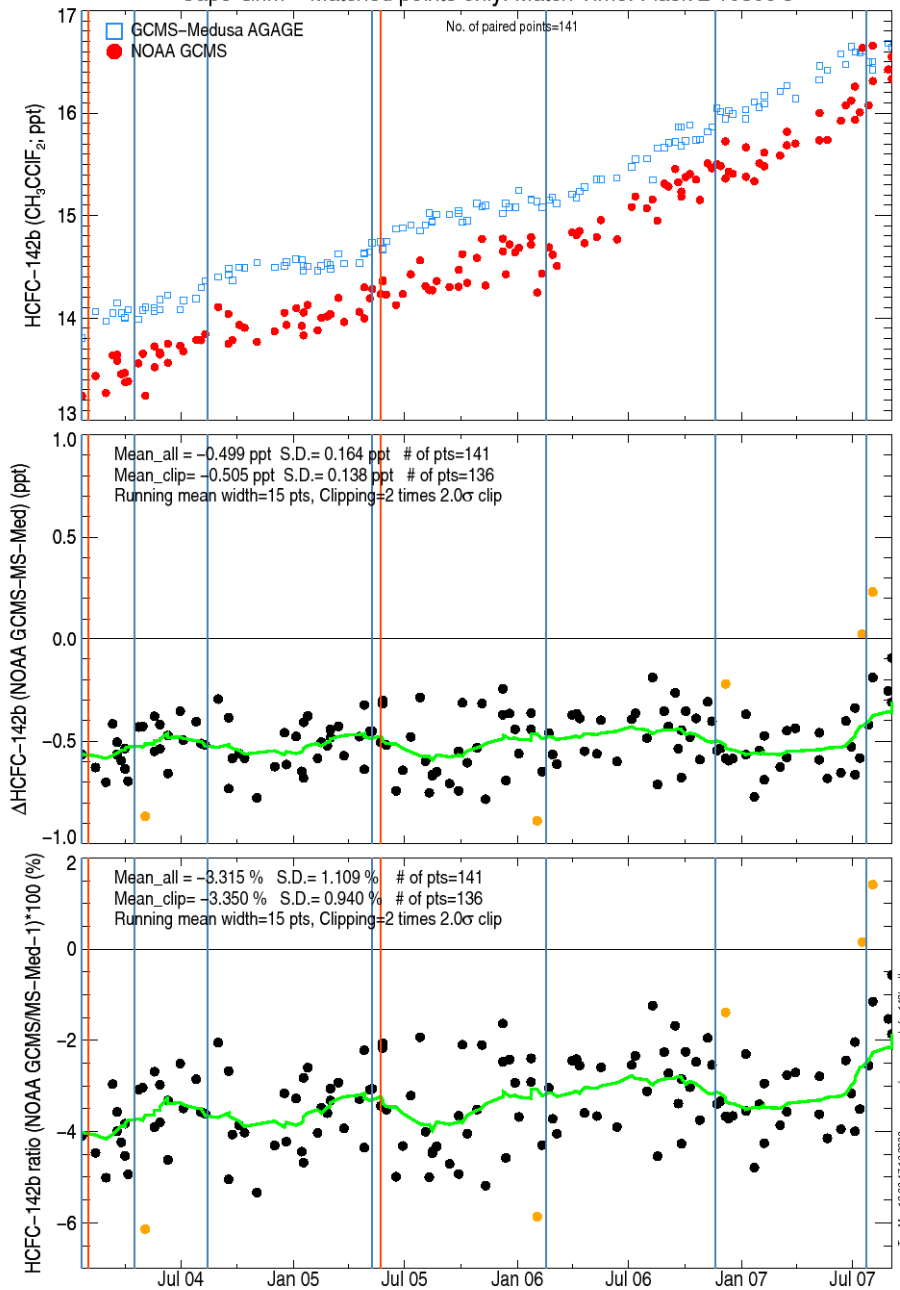
Cape Grim – Matched points only. Match Time: Flask ± 7200 s



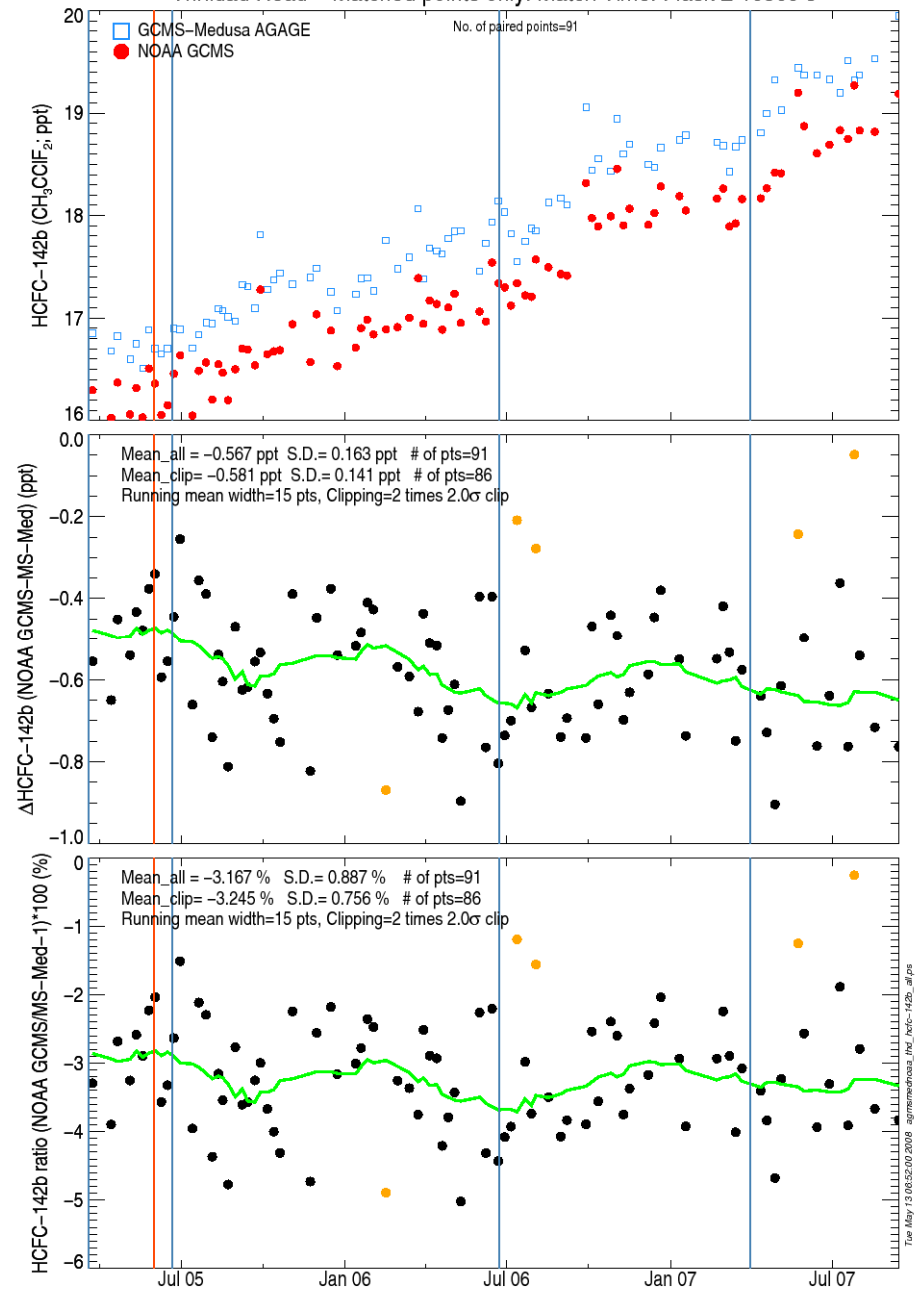
Barbados – Matched points only. Match Time: Flask ± 3600 s



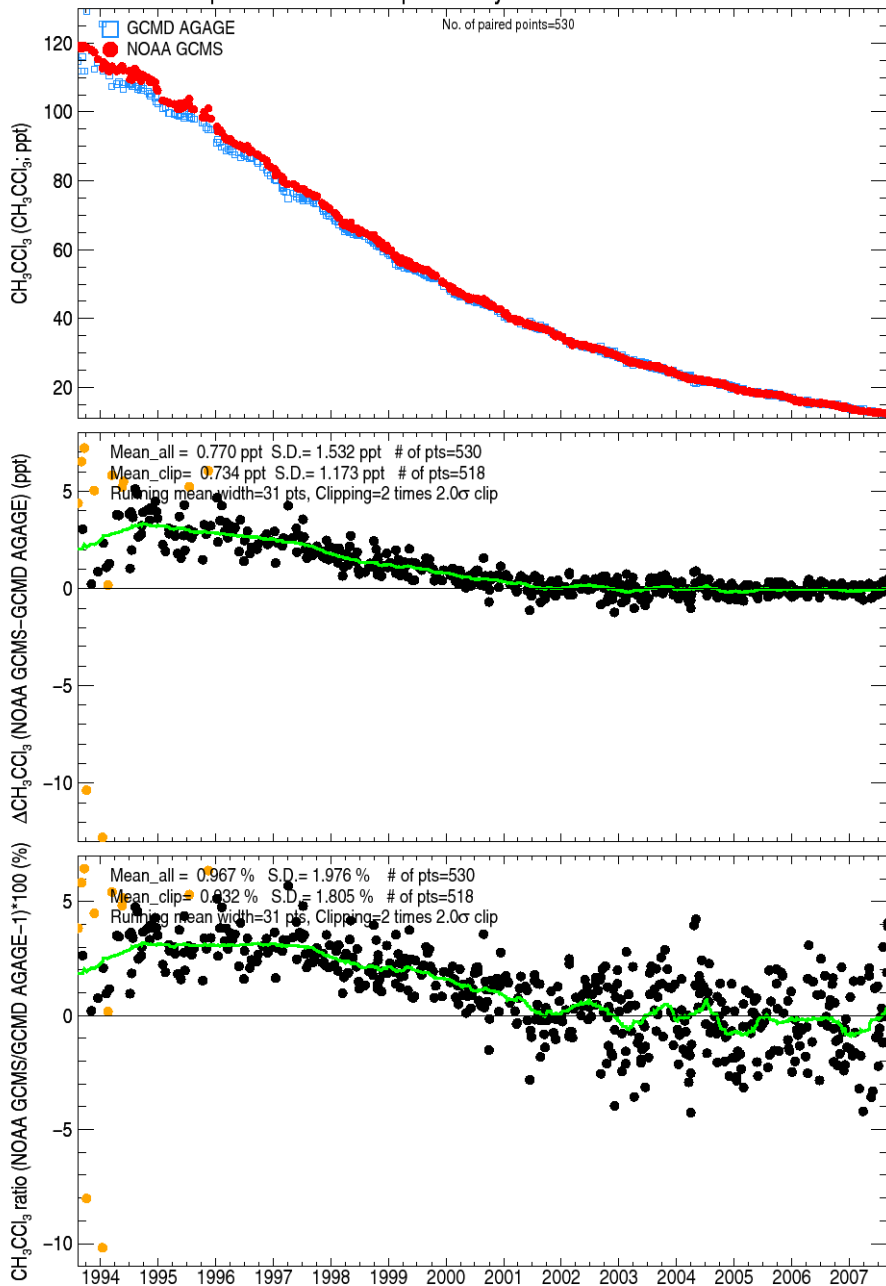
Cape Grim – Matched points only. Match Time: Flask ± 10800 s



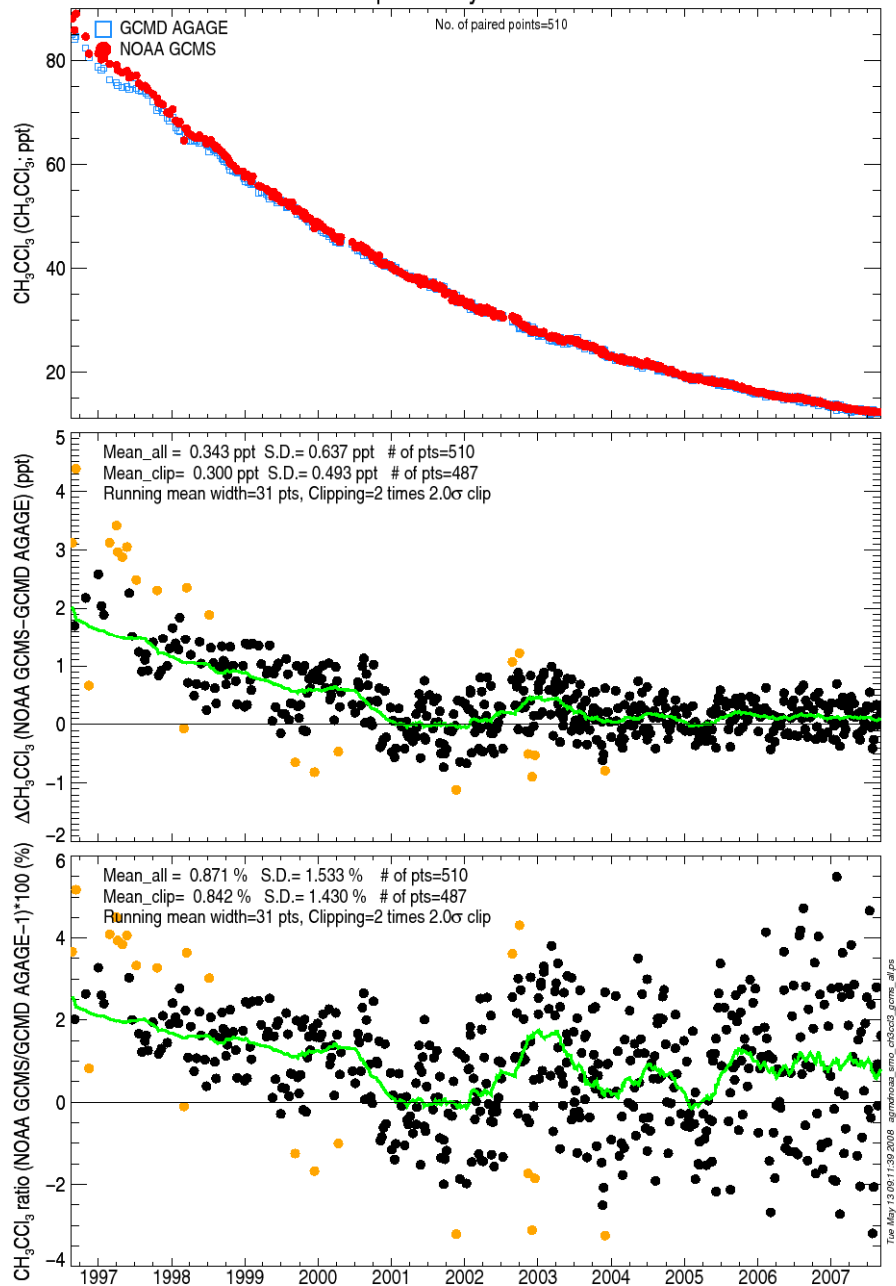
Trinidad Head – Matched points only. Match Time: Flask ± 10800 s



Cape Grim – Matched points only. Match Time: Flask ± 7200 s



Samoa – Matched points only. Match Time: Flask ± 7200 s

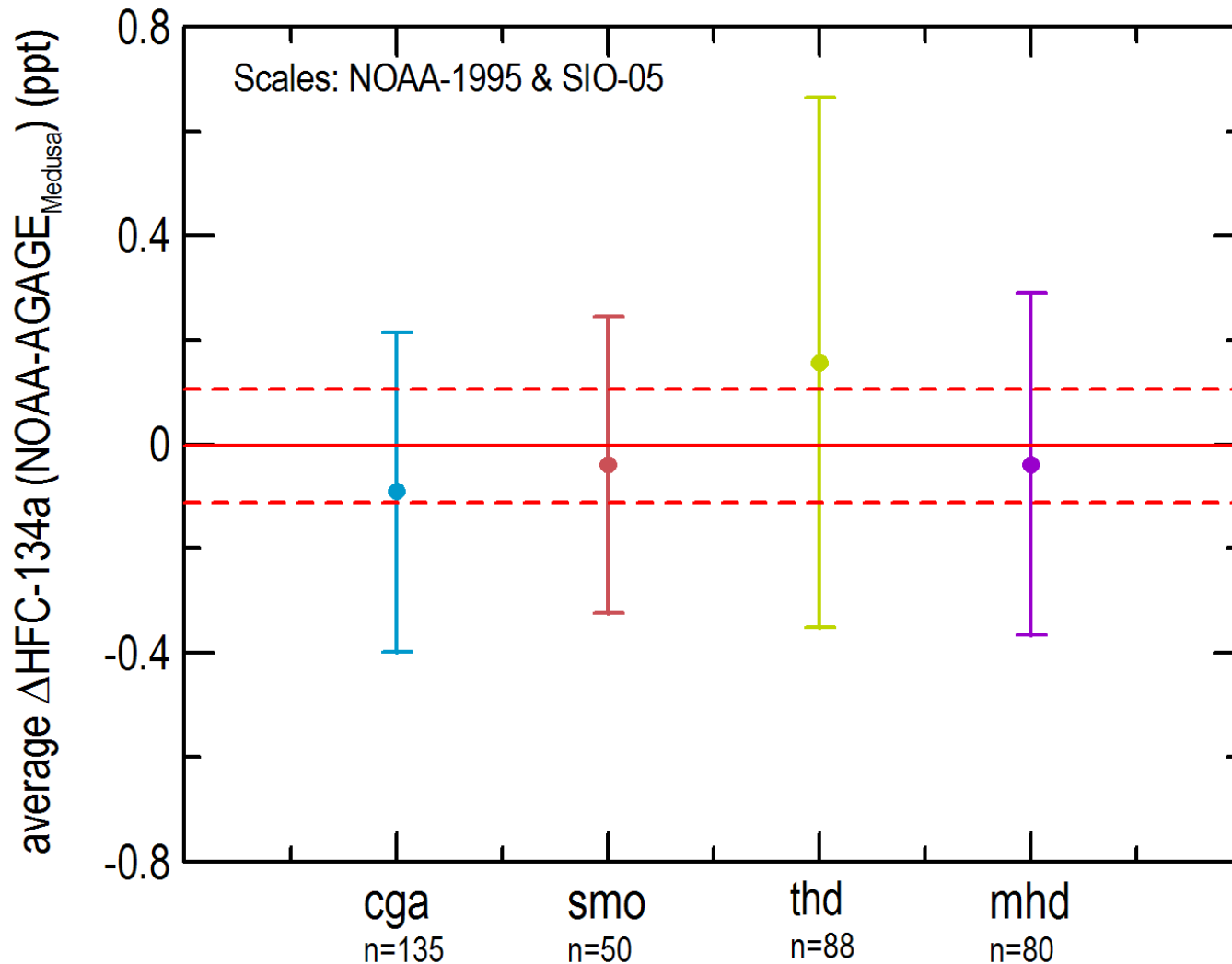


Average differences table work in progress

Currently produce large 20 page table showing statistics for all comparisons;
 Now want to produce summary table of average differences (similar to below) for all species in NOAA/AGAGE comparisons

Species	Scales NOAA AGAGE	Av conc diff (NOAA-AGAGE)	Av % diff (NOAA/AGAGE)	Comparison period	Comments
CH ₄	NOAA-2004 Tohoku Uni	1.23±1.01 ppb	0.07±0.06 %	Aug 1993 to Sep 2007	Excellent agreement
HCFC-142b	NOAA-1994 SIO-05	-0.53 ±0.04 ppt	-3.15 ±0.15%	Nov 2003 to Sep 2007	Small offset, good agreement
CH ₃ CCl ₃	NOAA-2003 SIO-05	0.38±0.25 ppt	0.97±0.30%	Aug 1993 to Sep 2007	Trend down until ~Jan 2001 then good agreement.
HFC-134a	NOAA-1995 SIO-05	-0.00±0.11 ppt	-0.01±0.34%	Nov 2003 to Sep 2007	Overall good agreement
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Have summary figures to accompany table



Thank You

Acknowledgements

All station personnel involved with the collection/filling of flasks and maintenance of *in situ* programs

Participants in the comparison exercise, especially the NOAA colleagues who contribute the bulk of the flask data

The AGAGE team