

Review of manuscript by Prinn et al. "History of Chemically and Radiatively Important Atmospheric Gases from the Advanced Global Atmospheric Gases Experiment (AGAGE)"

General Comments:

This is an overall well written and informative overview of the status of the AGAGE project. It is a timely publication, given that it has been some 18 years since the last overview published by Prinn et al. This is a very impressive project, led by the world leading experts in this field. Measurements and data are of the highest quality that are achievable with current technologies. Data are disseminated to the global community and used around the globe. There is a bit of redundancy in places, with the same/similar material/text being repeated in different sections.

I recommend publication of this manuscript after reasonable consideration of the comments listed below that may yield some further improvements to the overall nicely written document.

Please comment on the connection/relationship between AGAGE and the World Meteorological Organization Global Atmospheric Watch programme.

Specific Comments:

Page 2/Line 46:accomplishments, and

Figure 1: It would be nice to get a clearer description/definition of what criteria are applied for stations to be included as 'AGAGE Station' versus 'AGAGE Affiliate Station'. And what about other sites/programs in the world where related monitoring occurs? For instance, I saw at a recent visit to the Zugspitze Station that the German Umweltbundesamt Agency is conducting CFC monitoring at that site. What other programs are there that capture and report these same or a subset of these compounds? It would be nice to at least include a more inclusive summary/comparison of the global monitoring activities of these gases outside of AGAGE.

4/Table: What does the superscript '4' in the last column heading refer to?

4/Table: This table lists a number of non-methane hydrocarbons (NMHC) as well, though there is no mention/discussion in the text about NMHC being included in the AGAGE suite of measurements?

4/Table: Please explain how the 'precision' that is listed here was determined. An additional column that lists the overall measurement uncertainty (resulting from precision and accuracy) would be highly desirable.

5/1: Can you be more specific than 'spectroscopic'?

5/36-46: It would be good to also mention the Network for the Detection of Atmospheric Composition Change (NDACC, www.ndacc.org).

6/Figure 2: These plots are so small that their value is rather questionable. When data labeled 'red' are for 'polluted air', shouldn't then the data for all species at a given (polluted) time be labeled consistently that way?

6/7: It seems a bit odd that this section starts here, after data have already been presented in Section 1/Figure 2. Maybe the best solution is to just remove Figure 1 from the introduction section, and then instead have a blown up time series graph of fewer species presented and discussed later on for demonstrating the value of high time resolution data.

7/33: A description of the sampling line/material/flow condition/inlet filter/line heating would be good to also include in the Instrument Section.

7/35: The wording of this sentence is somewhat odd:increases ...being added

7/39: 'GWP' hasn't been defined. Further, I suggest to reword the whole term 'high-GWP electronics industry chemical NF3'.

8/47: Suggest deleting the word 'single'.

9/15: Again, as mentioned earlier, what does it take for a site to be an 'AGAGE program site', versus being an 'Affiliate Station', and why are other sites where global CFC monitoring is ongoing not affiliated or included?

10/1-8: It may be worth mentioning also that these instruments do not require a carrier gas supply, which eases their operation.

10/14: Please explain or provide reference for 'Allan' variance analyses.

10/Table 4: 'Station' instead of 'Stations'

10/Table 4: Explain abbreviation 'EN'.

11/1-27: Since these measurements are not really fully integrated into the AGAGE network (yet), this section seems to be pre-mature. I suggest deleting it entirely.

12/1: Wording seems odd: '...has continued to be developed'

12/10: Same here.

12/37-41: Please provide a bit more background info why/how it matters which of these two different standard preparation methods is used.

13/42:at remote sites

15/9: Would 'modelers' be a better term than 'theoreticians'?

16/0: It seems a bit odd that the statement 'briefly below' is then backed up with a series of references?

18/30-31: I think a few commas are missing before and after 'respectively'.

18/34: ...have continued to rise in

19/10: I for sure would like to know why CFC-11 emissions are rising again?

19/15: Are these halogenated gases included in the calculation of total stratospheric chlorine?

19/22: Please explain a bit more what is going on with CCl4.

19/32: ...AGAGE data, and ...

20/23: ...concentration has been ...

21/20: Please explain what 'Annex-1' countries are.

23/10: I suggest rephrasing this sentence. Maybe: "Using HCFC-22 data for estimating the mean OH concentration yields similar results"

23/21:significantly from year to year, but ...

23/29: ...OH concentrations, and CH₃CCl₃ emissions from

24/5: ...are then critically compared

24/18-19: This reads a bit odd. How can a 2005 paper be called an 'earlier study' when actually earlier data are being compared with that study?

24/23: Similar issue here. A paper published in 2008 can not really report on the 'recent' increase in methane. Maybe it reported the 'onset' of the renewed growth of methane.

24/28: ...nitrous oxide, and Xiao

24/30: It would be nice to learn a bit more about how the interhemispheric gradients in these beautiful data have improved our understanding of interhemispheric transport and hemispheric emission gradients.

24/51: ...used for estimating regional ...

25/17-37: Please clarify what exactly the AGAGE data policy is. From reading this section I get the impression that data are not publicly released until AGAGE scientists have written their own papers building on these data. This would really deviate from data policies that are stipulated by major (US) funding agencies that now require data products from federally funded projects to be released sooner, and within a fixed time frame no matter if and when the Principal Investigators have been able to publish their own papers by then.

25/33: ...these CO₂ data to the ...