

We thank the reviewer for their comments on the manuscript. Below we address the concerns and comments.

1. Introduction section. While these listed gases (in Table 1) might be obvious to the authors and folks in the community why they are important and why measured, this isn't necessary clear to the general readers outside the ODS community. To many, it reads like a long list of chemical compounds, mostly synthetic. It would be very helpful if you can add a paragraph describe these gases in groups, if possible, add the connection between groups. For example, major greenhouse gases, CFCs, HCFCs, HFCs, PFCs, and HFCs are ozone-friendly alternatives to CFCs and HCFCs, etc. This way, it helps the readers to understand why they are the target gases measured by AGAGE.

We have altered the first paragraph of the introduction so that it is much more descriptive of these trace gases. The first paragraph is now:

Quantifying the global emissions of halogenated and other long-lived radiatively and chemically important trace gases is crucial for estimating their environmental impacts, such as depletion of the stratospheric ozone layer, and contributions to radiative forcing. Chlorofluorocarbons (CFCs), halons, and the solvents carbon tetrachloride (CCl₄) and methyl chloroform (CH₃CCl₃) are trace gases that have been phased out for emissive use under the Montreal Protocol on Substances that Deplete the Ozone Layer. Emissions of these gases persist because they are still contained within appliances, foams, and other applications, produced before their phase out, and continue to leak into the atmosphere. In some cases, production is ongoing because of their exempted production for chemical manufacture. Some of these substances remain in the atmosphere for years to centuries after they are emitted, owing to their long atmospheric lifetimes. Where non-ozone-depleting alternatives could not immediately be found, these gases were replaced by hydrochlorofluorocarbons (HCFCs), which are currently being phased out under the Montreal Protocol. HCFCs are in turn being replaced by hydrofluorocarbons (HFCs). While HFC do not deplete ozone, they have large global warming potentials, much like the ozone-depleting substances that they replaced. As a result, the production of HFCs is now being phased down under the Kigali Amendment to the Montreal Protocol. Chlorinated very short-lived substances (C1-VSLS), with atmospheric lifetimes less than around six months, and some halomethanes, with both natural and anthropogenic sources, are not controlled under the Montreal Protocol and may present a threat to ozone layer recovery. Collectively, the controlled and uncontrolled ozone-depleting substances are responsible for almost all of the anthropogenic chlorine and bromine input to the stratosphere. There are a number of non-ozone depleting fluorocarbons that have extremely large global warming potentials, such as perfluorocarbons (PFCs), sulfur hexafluoride (SF₆) and nitrogen trifluoride (NF₃), and are almost entirely industrially produced. Halogenated substances, along with methane (CH₄),

which critically affects the oxidative capacity of the atmosphere, and nitrous oxide (N₂O), which is also an ozone-depleting substance, are responsible for almost all the gaseous radiative forcing from anthropogenic sources beyond that of carbon dioxide. As a result, monitoring of these gases is crucial to understand the state of the atmosphere.

2. Table 4. I would suggest the authors consider include an additional column of the tropospheric OH lifetime for all listed gases that derived with the 12-box model, in addition to the OH_a and OH_{e/r} values. This would be useful information in addition to the derived global emissions and can be compared with results from other published literature.

Good suggestion, thanks. These have been added to Table 4.

3. Section 4.2 A priori emissions. It is very nice to see the authors spend a tremendous amount of effort in gathering all possible bottom-up emissions and assemble into an a priori emissions inventory. I noticed that in the data availability section, only AGAGE-derived data sets are made available. I would strongly recommend that authors consider adding the a priori emissions into the data record as well, if possible.

These will be released alongside the derived products in the next release.

Isn't it more accurate to say "have been measuring" instead of "have measured"?

This has been changed.

L52-53. "AGAGE measurements are combined with the 12-box model and an inverse method to produce the derived products presented here". This sentence is out of place. It should be moved to a later section. May be section 3?

This has been moved to section 3.

"have been used have been selected"? you only need one, either used or selected.

This have been changed to "have been selected".

Is it possible to include in the supplementary a list of other sites (that are not included in this paper) and the related details? Some readers might find those information valuable, if in the future this becomes the AGAGE-goto paper?

This manuscript intends to be a description of derived products from the AGAGE network using a 12-box model. We intentionally do not want this to become the

'AGAGE-goto paper'. There is currently a manuscript in preparation, as an update to Prinn et al. (2018), which will include the requested details. We would prefer to save this information for that manuscript.

L112, L125 & L134. You should use southern and northern hemisphere consistently, either all start with upper cases or all with lower cases.

Thank you. This has been changed to upper case, e.g., Northern Hemisphere.

L235 & L242. Consider change "a priori set of emission estimates" to "a priori emissions". It is a bit redundant as you also use an estimate of emissions right after this.

Thanks, this has been changed as suggested.

L243-L244. I don't think you need this sentence. It is a bit hand-waving and unnecessary. Just end with "available bottom-up estimates" in the previous sentence is adequate.

OK, deleted.