

Comments on 'Potential environmental impact of bromoform from Asparagopsis farming in Australia' by Jia *et al.* for *Atmos. Chem. Phys.*

Paul Fraser, CSIRO Oceans and Atmosphere, Aspendale, Victoria

Page 1, line 9: delete '4811' – no other co-author post-codes listed

Page 2, line 25: 'which contributes'

Page 2, line 28: 'with its ozone depletion potential'

Page 2, line 29: replace 'halogens' with 'halocarbons'

Page 2, line 35: 'significantly impact'

Page 2, line 37: '0.02%' – significant figures implied by 0.016% probably not justified

Page 2, line 37-38: 'The remains are relatively small' does not make sense

Page 2, line 39: 0.5% (as above)

Page 3, line 44: 'GHG emissions weighted by radiative forcing'

Page 3, line 47: 'emissions'

Page 3, line 48-49: is this what you mean – 'Total methane (CH<sub>4</sub>) emissions from ruminant livestock contribute about 18% of total global CH<sub>4</sub> emissions'

Page 3, line 51: quote GWP and lifetime data for CH<sub>4</sub> from more recent IPCC assessments: IPCC Climate Change 2021

Page 3, line 56: 'inefficient digestion process'

Page 4, line 74: Carpenter and Liss, 2000

Page 4, line 77-78: Engel, Rigby *et al.*, 2018

Page 4, line 81: Carpenter, Reimann *et al.*, 2014

Page 4, line 83-84: in the lower and middle stratosphere

Page 4, line 85: Black *et al.* 2021 not in reference list

Page 5, line 115: For an effective

Page 5, line 115: 0.4%? Can two significant figures (0.38%) be justified; could the experiments distinguish between results for 0.38% and 0.40?

Page 5, line 119:  $3.5 \times 10^4$  Mg – 5 significant figures??

Page 5, line 121:  $2.3 \times 10^4$  Mg – 5 significant figures??

Page 6, line 135:  $1.2 \times 10^4$  Mg

Page 6, line 139:  $3.5 \times 10^4$  Mg

Page 6, line 147: Yong et al. (2013)

Page 7, line 166: which farms are actual and theoretical?

Page 8, line 171:  $1.2 \times 10^4$  Mg

Page 9, line 180: listed as Magnusson et al. 2020 in reference list

Page 9, line 185: 1650 ng, the Paul et al. release is quoted to 2 significant figures: 1100 ng

Page 9, line 187: OK, 1600 ng, ignore above

Page 9, line 191: were used in this study

Page 10, line 211: Mass et al references are listed as 2019 and 2021

Page 10, line 228: inter-? Interpolation?

Page 11, line 247:  $3.5 \times 10^4$  Mg

Page 12, line 285: Montzka, Reimann *et al.* 2010

Page 14, line 298: to that of the reference substance CFC-11 ( $\text{CCl}_3\text{F}$ ) on a mass emitted basis

Page 14, line 300: long-lived halocarbons

Page 14, line 304: from the same unit mass emission of CFC-11

Page 14, line 307:  $\text{CHBr}_3$

Page 15 line 326: the ODP values applied here

Page 15, line 328: Engel, Rigby *et al.*

Page 15, line 329-330: impact on the comparison.....ODP weighted emissions presented here.

Page 18, line 324: to simulate the enhanced atmospheric  $\text{CHBr}_3$  mixing ratios (above natural background) for each...

Page 18, line 395: Background  $\text{CHBr}_3$  levels are calculated.... These background levels derived from Ziska et al. need to be discussed. Do the authors use the latitudinally averaged data (Figure 2 of Ziska et al.). It would be instructive to compare the background  $\text{CHBr}_3$  levels from Ziska et al. assumed for Triabunna, Tasmania (about 0.5 ppt?) to publicly available (and published) observations at Cape Grim, Tasmania (annual average about 1-2 ppt). The Ziska data compendium are from various laboratories but are not intercalibrated. The Triabunna background  $\text{CHBr}_3$  level could be as high as 2 ppt – what difference would this make to the flux calculations?

Page 18, line 398: Figure S1 compares calculated  $\text{CHBr}_3$  mixing ratios due to Asparagopsis farming at GTY and Darwin compared to appropriate Ziska mixing ratios (need to state latitude of Ziska data). The Figure shows mixing ratios only, not emissions, so need to state this and then say what this implies about emissions. The background surface  $\text{CHBr}_3$  mixing

ratios in Figure S1 are 0.01 ppt, this an order of magnitude lower than the Ziska data for Darwin latitudes (minimum 0.5 ppt). Am I missing something here?

Page 18, line 400: Compared to Figure S1, Figure 4 has Ziska coastal surface mixing ratios of 0.05 ppt, 5 times Figure S1??

Page 18, line 409: Figure 5 shows Ziska coastal CHBr<sub>3</sub> mixing ratios of 0.1 ppt or higher, at least 2 times Figure 4 and 10Xx Figure S1??

Page 21, Figure 4 caption: Altitude-time cross-sections of CHBr<sub>3</sub> mixing ratio averaged over [...] from a)...

Page 22, line 456: I would have thought that the ODP distribution also depends on the surface location of the CHBr<sub>3</sub> emissions (as well as seasonal transport, location of ITCZ etc). Which emission scenario (strength, location) is used to calculate the ODP distribution?

Page 23, line 479-480: 1.1%, 2.9%

Page 24, line 500: ...ODP of CHBr<sub>3</sub> in January.... Specify emission scenario?

Page 25, line 514: 3.47

Page 25, line 520: CHBr<sub>3</sub>

Page 26, line 527, 532, 542: CHBr<sub>3</sub>

Page 26, line 550: laboratory scale

Page 28, line 608: Battaglia not cited (I may have missed it)

Page 28, line 614: Black et al. 2021 not listed

Page 29, line 663: Herrero et al 2016 not cited (I may have missed it)

Page 31, line 728: Machado et al. 2014 not cited (I may have missed it)

Page 31, line 746: Marshall et al. should be listed before Mata et al.

Page 32, line 775: Montzka, Reimann et al.

Page 33, line 840: Wuebbles et al. 1983 not cited (I may have missed it)

