

Interactive comment on “Halon-1301 — further evidence of its performance as an age tracer in New Zealand groundwater” by Monique Beyer et al.

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Review of Halon 1301 – Further evidence of its performance as an age tracer in New Zealand Groundwater This manuscript presents an extensive data set for H1301, building on that previously published by the lead author in HESS 19, 2775-2789, 2015 and WRR, 50, WR015818, 2014.

Main Comments:

Despite the impressive data set I was slightly disappointed at the level of greater understanding that was gained from this. In particular, the unavailability of other tracers at some sites which would have hopefully given greater lucidity as to the retarda-

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tion/removal processes taking place. I think this is a significant weakness in the paper although not one that the authors can rectify. I do think however that more thought needs to go into the discussion as this is key to the main knowledge advancement that the paper could potentially provide.

Where low concentrations of H1301 are found, have the authors considered degassing of N₂ (as a result of denitrification) or CH₄ as possible mechanisms for removal. Without any NO₃ data this is hard for the reviewer to assess. I would therefore refer the authors to Visser et al 2007 (WRR 43, 10 W10434) and Visser et al. 2009 (JoH 369, 4-4, 427-439) where the issue of tracer degassing is discussed in extensive detail.

Related to this, I am interested that the authors are using N₂/Ar ratios to correct for excess air, rather than the more normally accepted Ne. Could they comment on the possible issues relating to this, especially if denitrification is taking place.

As a general observation there are far too many figures and figures within figures – As these are not really discussed in any detail, the true significance is not clear.

Minor Comments:

P1 Line 13. Could not rather than “couldn’t”

P1 Line 29. More description on the (speculation?) causes of H1301 reduction is needed here. In the Introduction section you are only really referring to recent groundwater age indicators and you need to be explicit about that. As a general overview of the state of the art I would refer the authors to Aulina et al 2014 (Applied Geochemistry 50, 115-117) and Darling et al 2012 (Applied Geochemistry 27, 9, 1688-1697).

P2 line 13 would add Darling and Goody 2007 (Science of the Total Environment 387, 353-362)

P2 Line 15 after ambiguous age interpretations add Suckow 2014 (Applied Geochemistry 50, 222-230)

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P3 Line 12 replace 'They' with Bartyzel et al (2016)

P4 Line 8 add reference to Oster 1996

P6 Question. Is the input function for S Hemisphere and N hemisphere the same for H1301? Some reference to the differences would be helpful for other/future practitioners.

P8 Line 19. Delete 'in fact'

P9 Line 18. Give reference for the 'issues' eluded to.

P11 Line 10. Need to justify assertion that T is one of the 'most reliable'. What do you mean by reliable?

P11 Line 14. The input of SF6 is exponential and not 'near linear'.

P13 line 15. Add in text relating to degassing potential.

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