

## ***Interactive comment on “A comprehensive global oceanic dataset of helium isotope and tritium measurements” by William J. Jenkins et al.***

**Anonymous Referee #1**

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The authors have organized all existing oceanic measurements of helium-isotope and tritium data into a single comprehensive data set, complete with uncertainty estimates and valuable metadata on data quality and measurement methods. This tracer data is invaluable to oceanography and collecting it all in a single place is a significant service to the scientific community. This short paper accompanying the data set is appropriate and useful. I found the descriptions of the analytical methods useful and I enjoyed the tributes to pioneers Clarke and Ostlund. Subject to minor revisions, I recommend publication.

My main comment is that with 22% of the data being neon measurements, there should be at least a paragraph discussing the use of the neon data with some references, and perhaps a figure on neon. I assume neon, having only stable natural isotopes, is used

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to constrain air-sea gas exchange, but I don't know of all its uses in oceanography and suspect I'm not alone in this. Some discussion on neon would be useful. Perhaps a graphic on observed neon surface saturation could be shown.

Minor comments just concern occasional clarity issues and typographical/grammatical errors:

P1 L19 typo: ... with a half-life of 12.3 years ... “half-life of” is missing

P2 L24 typo: either measurement “of” or “measurement” should be “measuring”

P2 L27 water samples -> gas samples ? (electrolysis enriches the gas, not the water)

P3 L13 “magnetic sector instrument” please explain what this means on first usage (e.g., is it different from a mass spectrometer deflecting ions as they traverse a magnetic field?)

P3 L22: could the ionization state on  $4\text{He}$  and  $20\text{Ne}$  in the iron currents be indicated here?

P3 L22 “helium/neon” -> “helium or neon” otherwise this is suggesting that the helium/neon ratio is somehow involved, which presumably is not the intent.

P4 L2 typo: additional -> addition

P4 L13: “The dataset ...” On a first reading, I immediately wanted to know what the file format was – it might be nice to add a parenthetical “(digital formats are specified below)”.

P4 L14 “in principle” seems inappropriate here. Perhaps you mean: “Where available, this provides ...”

P4 L15 “methods fields” – delete “methods”

P4 L18 typo: “in the Table 1” -> “in Table 1”

Section 2.5 (Data formats and availability) Why is data in netcdf format not included?

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Arguably this is the standard for portable data in the geosciences.

Section 3 “Graphics and examples” seems like a very poor heading for a section because it is so generic and non-descriptive. How about “Scope and nature of the dataset” instead?

P5 L4 “. . . for maximum flexibility. For maximum flexibility, we . . .” Delete the first “for maximum flexibility”

P5 L10 “example graphics” delete “example”

P5 L22 delete “basically” or make precise qualifying statement

P6 L5 There were also a number atmospheric, as well as submarine, nuclear tests in the Southern Hemisphere by the British and French militaries. Please add a few sentences of discussion on this and perhaps point out if this is discernible in the available oceanographic data (some of the spikes in the southern bands?) What was the estimated tritium production by nuclear testing in each hemisphere?

L11 P6 there is a grammar issue: “A benchmark observations” should this be singular? – please check sentence and fix.

L13 P6 Figure 5 should be Figure 4.

L14 P6 “along a section along” -> “along a section at”

L20 P6 “Equally important is the bottom-contour-hugging . . .” This sentence is very unclear. What does it mean for a “level” to hug a “bottom contour”? It is unclear what in the figure is being described – please reword for clarity.

L23 P6 Figure 4 should be Figure 5. Also “those” sections – obscure – same as in Figure 4 – please restate.

L30 P6 “We also include a . . .” You need to explicitly reference “Figure 6”

L1 P7 “excess  $^3\text{He}$ ” what does “excess” mean here? Do you mean elevated relative to

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the atmospheric  $^3\text{He}/^4\text{He}$  ratio or excess over global mean or something else? Please clarify and perhaps just refer to  $\delta^3\text{He}$  as that is precisely defined.

P9 L9-10 and L16-17 “Although his early . . . and the ocean” This is a repeat of the exact same sentence – should probably have been deleted from L9-10

P9 L19 “fuel” seems a bit like the wrong word here. “Energy source” ?

Figure 4: why is the decay-corrected tritium in the upper ocean higher in 2012 than in 2003? This seems like a prominent feature of this figure that should be briefly discussed in the text.

Figure 6: “vicinity” what is the lat and lon?

Figure 7: “Perhaps Reiner and I . . .” Please remove internal commentary among co-authors (i.e., please proof-read your paper and captions . . .)

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