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Interactive comment on "The 129-Iodine content of subtropical Pacific waters: impact of Fukushima and other anthropogenic ^{129}I sources" *by* T. P. Guilderson et al.

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Overview This paper outlines a suite of 129I measurements on seawater samples collected in the North Pacific Ocean following the 2011 Fukushima nuclear reactor accident. The authors have used these data to characterise the Fukushima derived 129I signal in the Pacific, estimate the overall discharge budget and evaluate far-field impacts in the California current. This is a thorough, carefully reasoned paper that makes an important contribution both with respect to the impacts associated with marine discharges of Fukushima 129I and with elevating the discussion about analytical standards for 129I measurements in the ocean. It should be published in Biogeosciences

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Interactive Discussion
Discussion Paper

Diss., with consideration to the few minor comments below.

Comments 1. Since there is little discussion of environmental phases other than seawater in this paper, it would seem that a better unit than 129I/127I ratio (also referred to as iodine units or IU) is simply Bq/l or atoms/l. The use of the 129I/127I ratio in the ocean is an analogue for tritium units, but iodine is not conservative in the ocean, especially in coastal regimes. Therefore, one never knows for sure if changes in the 129I/127I ratio are caused by changes in either or both of 129I or 127I concentrations. Since the 127I concentration is of no particular interest, why burden the reader with an additional set of (dimensionless) units? Further, these units cannot be used to evaluate mixing between water masses having different 129I/127I ratios since they are dimensionless. Where they are useful is in studies of transport between phases, for example studies of seawater:seaweed exchange or seawater:sediment exchanges. Obviously it is not incorrect to use them and the authors are usually careful to supply values in Bq/m3 as well, but for an oceanographic audience (as opposed to those studying contaminant transport across phase boundaries) used to ordinary concentration units, they are a little confusing, counter-intuitive and make the discussion a little opaque.

Reply Comment 1:

We concur with the reviewer that the nomenclature and (lack of) standardization in the iodine literature can be vexing. We chose to present the results as Bq/m3 and it's corollary in the open ocean, 129I/127I, due to the main potential audience. The special issue publication seems to be populated by, and intended for, radiochemists for which we chose Bq/m3 (and from which one can calculate atoms/m3 or atoms/L). As isotopists, ratios are a valued currency which is why we included 129I/127I ratios.

2. Although the use of potential density is technically correct, it does impede an intuitive sense of which part of the water column is being referred to. Perhaps the authors could remind the readers of the water depths at which various changes in 129I concentrations occur. Otherwise, non-specialists are going to skim over the text pretty quickly.

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Reply Comment 2:

Although we include depth statements in conjunction with densities in the overviews, in the revised version we will pay closer attention to make sure that the depth and isopycnals are described equally in all instances. We chose to highlight more in the density domain because of the unique location of the KOK sample suite: at the edge of the North Pacific Subtropical Gyre. Because of the compression of isopycnals at the edge of the gyre, a depth location given here is not going to be the same as towards the center of the gyre and the 'non specialists/oceanographers' might make a mistake of translating depth to all regions, equally (c.f. figure below).

3. Line 10- 11, pg 11937; last clause is lacking a verb.

Reply Comment 3:

We will rectify this in the revised version.

4. Line 15; capitalize Ocean.

Reply Comment 4: We will rectify this in the revised version.

5. In general, the figures are not as descriptive as they could be. They seem dry and technical and could all use some creative dash.

Reply Comment 5: We appreciate the reviewer's desire for more creative dash. However, given the topic and the relationship to the catastrophe at Dai'ichi Fukushima, we believe that dry and technical is more appropriate.

6. Fig. 3 caption; identify samples as seawater samples.

Reply Comment 6: We will rectify this in the revised version.

7. Fig. 5. A better sense of sample location would be helpful for this figure. . ..possibly an additional panel containing a map with sample locations identified by color coding.

Reply Comment 7:

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This was an obvious oversight. Such a figure should have been included in the original submission. In the revised version we will include a figure similar to the one below which shows the location of 129I profiles discussed in the text. In this figure we include SY07-05 which was graphically recreated in Sukuki et al, 2013 but for which the data were not tabulated (nor in the original Sukuki et al., 2010 paper where the profile was first presented). The raster image is annual mean sea surface temperature from the World Ocean Atlas (2009). Contours are lines of constant potential density for the 26.8 kg/m3 isopycnal calculated from WOA 2009.

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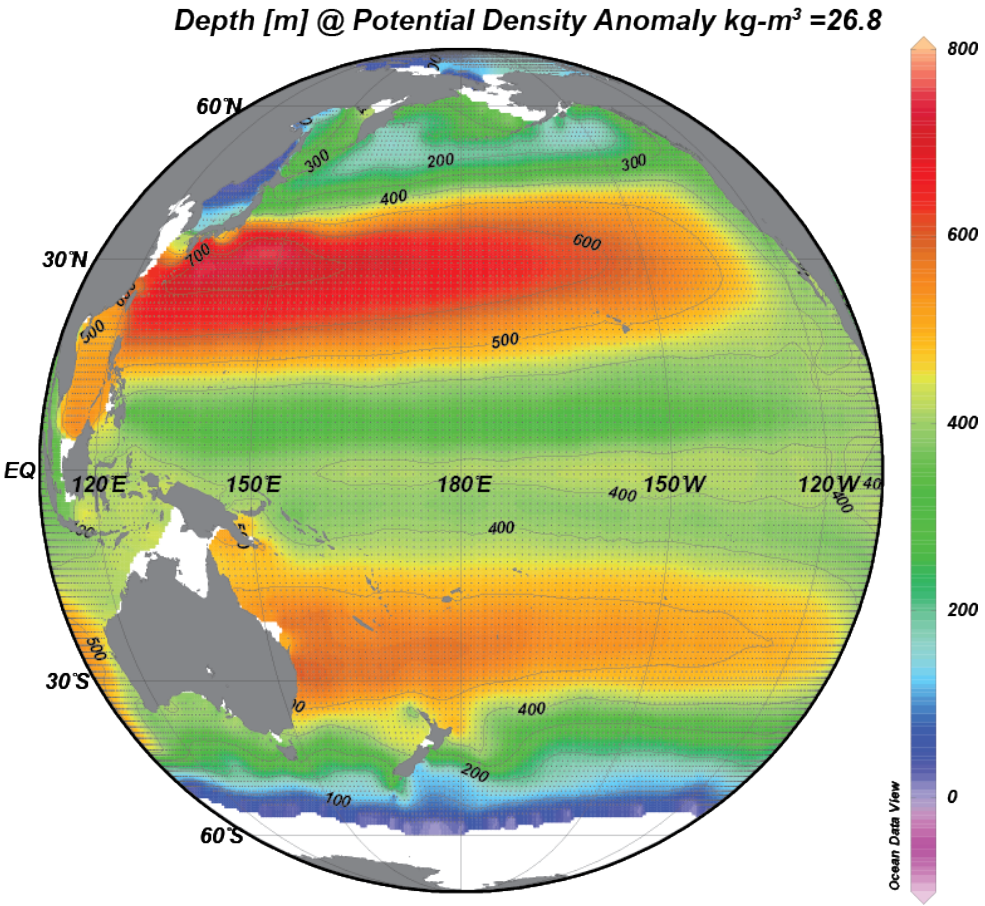

Fig. 1.

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Interactive Comment