

Review of “The 129-Iodine content of subtropical Pacific waters: impact of Fukushima and other anthropogenic 129I sources” by Guilderson et al.

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 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.
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.
3. Line 10- 11, pg 11937; last clause is lacking a verb.
4. Line 15; capitalize Ocean.
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.
6. Fig. 3 caption; identify samples as seawater samples.
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.