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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.

Anonymous Referee #1

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General comments: The paper presents interesting information about distribution of iodine isotope (129I) in marine waters sampled at approximately 2-3 months after the disaster at the Dia'ichi Fukushima Nuclear Power Plant. The paper also uses the relation between 134Cs, 137Cs and 129I to calculate the 129I discharge off the Fukushima into the studied part of the Pacific Ocean. The author's estimate, however, is not as that given by an earlier investigation. Several aspects of comparison with available background data on 129I and other isotopes were also used together with ocean transport models to estimate the distribution and sources, other than the Fukushima, in the upper 250 m of the studied section of the Pacific Ocean. As with any scientific work, some shortcomings and inaccuracies in citation, analytical work and discussion are

encountered and are presented below. However, may major concern is related to the rather short and reduced description of the oceanographic processes along the transect used and impacts on the interpretation of the data. Specific comments: 1. As mentioned by the authors in Figure 1, the transect used for the sampling lies in a critical oceanographic position that separates the cold Arctic-related front from the warm subtropical-related front. Along this part of the Pacific, the Oyashio Current brings cold Arctic water that flows south and circulates counterclockwise in the western north part. The effect of this water parcel and possible inclusion of 129I from the Arctic Ocean has not been considered. Although this current may bring small amount of 129I, but these can be significant when compared to the also small amounts discharged from the Fukushima. Furthermore, it is not clear why the depth penetration of the 129I signal is deeper in near shore compared to off shore and what mechanisms control this feature. 2. The authors uses a common value of 127I to calculate the 129I/127I ratio which adds a weak component to the interpretation as it is quite known that 127I concentration can vary a lot in ocean water with respect to depth and distance from shores. 3. It is difficult to understand the representation of the about 1 kg of 129I direct discharge. Is that a direct discharge just into the sea or even to the atmosphere? How much is the accuracy of the estimate? 4. The authors further use a term called excess inventory of 129I calculated from 134Cs data. As the authors also mention in the text, the chemistry of these two isotopes is rather different in aquatic environment in terms of ionization forms and uptake (iodine is taken by the biomass while Cs is rejected). Therefore the estimate of the excess inventory should be considered with large errors. 5. Iodine as element is taken by and adsorbed to planktons, algae, seaweeds and even larger organism. This feature adds further uncertainty to the estimates of 129I given in the paper. Unfortunately, consideration of this aspect has been neglected in the paper which is vital for the understanding of iodine budget in the ocean. 6. The relatively high values observed along the Californian current seem strange as also mentioned by the authors. The source as from the Columbia River needs further input. 7. The paper without doubt provides interesting information about 129I and improvement can

be achieved through consideration of comments.

Interactive comment on Biogeosciences Discuss., 10, 19935, 2013.