Biogeosciences Discuss., 10, C1244–C1249, 2013
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Biogeosciences Discussions



# *Interactive comment on* "$^{90}$Sr and $^{89}$Sr in seawater off Japan as a consequence of the Fukushima Dai-ichi nuclear accident" *by* N. Casacuberta et al.

**N. Casacuberta et al.**

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Reviewer comment 1: In order to avoid misunderstanding in the sentences like: 90Sr ranges from . . . to. . . and 89Sr ranges from . . . to . . . please, explain in Abstract and Results sections that 90Sr and 89values cannot be compared because they are not measured in the same samples (57 for 90Sr and only 19 for 89Sr and ususally in those that present the highest 90Sr values).

Author response: This has now been clarified in the Abstract and now reads as follow: "Here we evaluate the distribution of Fukushima-derived 90Sr (n=57) and 89Sr (n=19) throughout waters 30-600 km offshore in June 2011." Also in the Results section: "Concentrations of 90Sr (n=57) and 89Sr (n=19) in seawater samples collected. . . ".



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Reviewer comment 2: Please, explain clearly in the text if the provided 89Sr values are referred to measurement date of to sampling date.

Author response: This has been included both in the text and in Table 1 caption. “All activities are referred to sampling date”.

Reviewer comment 3: I do not understand the meaning or usefulness of section “89Sr/90Sr ratio”. Why the “time delay between sampling and accident” is calculated if this value is known with an approximation better than 98+/-18, which is the value that authors obtain? Even in section 4.2, authors assume that 90Sr peak has been released to the Pacific Ocean on 6 April, and sampling dates are also known. If the objective is to demonstrate that 89Sr comes from Fukushima accident, in my opinion it is clear that with a half-life of 50 days, this radionuclide cannot have another origin.

Author response: We agree with the reviewer on stating that this section is not providing with new information, as the accident date is already well known. However, by calculating the time delay between sampling and accident we are providing with another way of using the 89Sr/90Sr ratio, other than the one used in Povinec et al (2012) in which they calculate the ratio at reactor. Thus we thought it was interesting to use our 89Sr numbers, together with the results obtained in Povinec, to prove that 89Sr was indeed coming from Fukushima, by matching the calculated delay time with the already known value. To make this clear, section 4.2 has been changed accordingly: “The 89Sr/90Sr net ratio (subtracting 90Sr background concentrations) can be used to estimate the time delay between sampling and the Fukushima accident (time of nuclear reactor cease). Although the nuclear accident was well known, the ratio was used to corroborate it and thus prove the 89Sr source being Fukushima NPP. Time delay calculated for each sample (Table 2) was estimated by using the following Eq (1):”

Reviewer comment 4: Table 1 and Fig 3 has very small source size, it is quite difficult to read it.

Author response: Figure 3 has been changed according to the reviewer’s suggestion



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(see below). Regarding Table 1 we prefer having it in a single page. However, if the final edition looks too small we will ask the editors to split it in two pages.

Reviewer comment 5: The same for Figures 2 and 4 (right hand plots). It is almost impossible to read them.

Author response: Figures 2 and 4 have been changed according to the reviewer's suggestion (see below).

Reviewer comment 6: In Fig 1, Fig 2 and Fig 3 it is supposed that the grey contour corresponds to Japanese coast and the red star in Fig 1, Fukushima NPP. Please if this is true, explain it in the text.

Author response: Explanation on what the grey contour and red star stand for, has been included in Figures 1 and 2.

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Interactive comment on Biogeosciences Discuss., 10, 2039, 2013.





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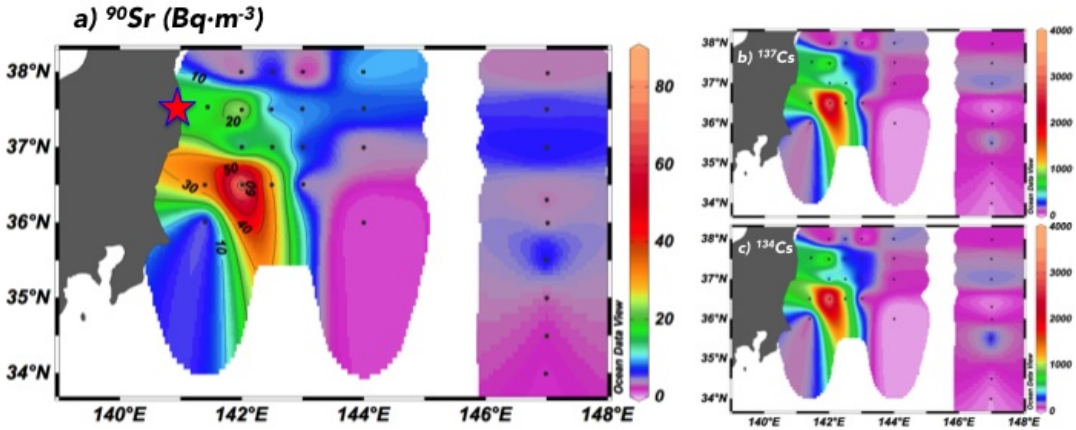


**Fig. 1.** Figure 2



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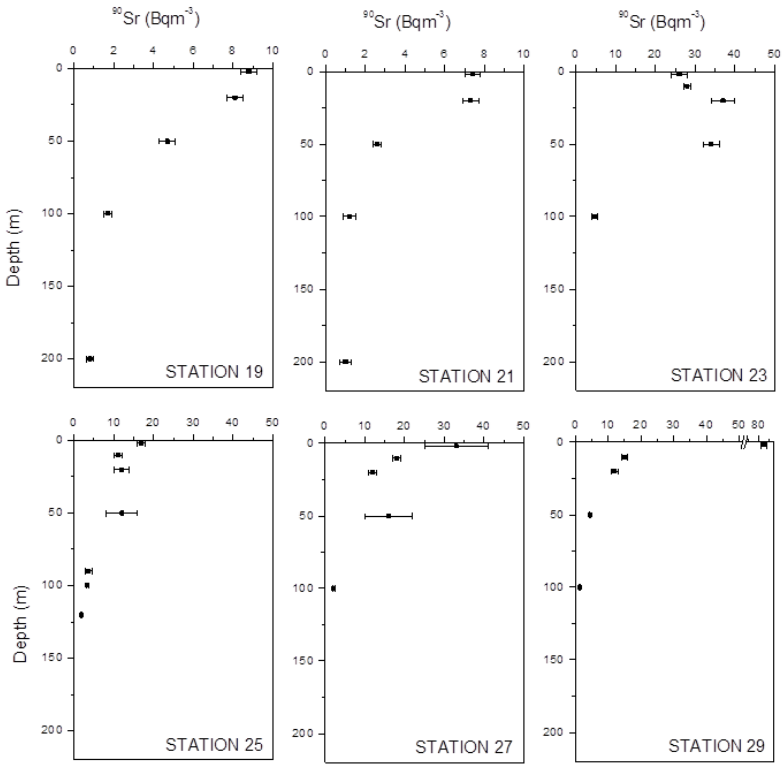


**Fig. 2.** Figure 3



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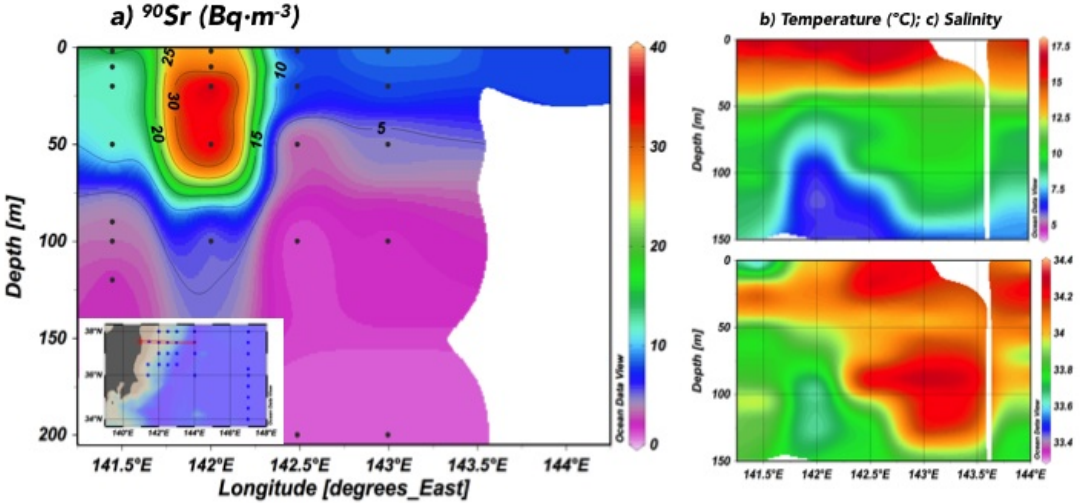


**Fig. 3.** Figure 4



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