

***Interactive comment on “Ecosystem model-based approach for modelling the dynamics of  $^{137}\text{Cs}$  transfer to marine plankton populations: application to the western North Pacific Ocean after the Fukushima nuclear power plant accident” by M. Belharet et al.***

**M. Belharet et al.**

mokrane.belharet@gmail.com

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Question:

I fail to see the point of this paper. The authors' goal of the paper was stated as: “We presented a modelling approach based on an ecosystem model to estimate the  $^{137}\text{Cs}$  activity in marine plankton populations following the Fukushima nuclear power plant (FNPP) accident: : :” I am not going to quibble too much about the strengths of the

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model and its details, which seem to be mostly sensible, but why do this in the first place? Why not simply measure Cs activities in the plankton, or rely on other people's measurements?

Answer:

The aim of this paper was to present an approach for modelling the transfer of cesium in planktonic populations as a first step before modelling its transfer to fish in an accidental situation. Of course it is worth having field data but as it appears in the case of Fukushima, there are not so many data on plankton and in case of an accident the only way to get clues about the impact on the marine food chains is to have tools: modelling is one of them. We know that sampling of plankton, especially phytoplankton, is very difficult and that data will always be limited in number. Being involved in a modelling work, we of course rely on other people's measurements and we are aware that such precious data are available thanks to the scientists working in the field off the Fukushima coast (see recent paper by Baumann et al., 2015, Deep-sea-res)

Question:

Betinetti & Manca - there are much better references for this statement

Answer:

The reference “Bettinetti and Manca, 2013” is replaced by : Fowler and Fisher (2005) , Fisher et al. (2000)

(Fowler,S.W., Fisher,N.S.,2005. Radionuclides in the biosphere. In: Hugh,D.L. (Ed.), Radioactivity in the Environment. Elsevier, pp. 167–203 (Chapter6) )

Fisher, N.S., Stupakoff,I., Sanudo-Wilhelmy,S., Wang,W.-X., Teysie,J.-L., Fowler,S. W.,Crusius,J., 2000. Trace metals in marine copepods: a field test of a bioaccumulation model coupled to laboratory uptake kinetics data. Mar. Ecol. Prog. Ser. 194,211–218.

Question:

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“Plankton populations were largely affected by this contamination ...” Really? How? I doubt it.

Answer:

It is perhaps a problem of language. In English contaminated is likely the proper word. The term “largely” has been deleted. “Plankton populations were contaminated by these releases”

Question:

Statement that reads “Consequently, the effective consideration of all these factors implies that the modelling approach of radionuclide transfer to marine biota should be driven by an ecosystem model describing different ecological processes and transfers between organisms in the food web” is not at all convincing. Again, why develop a model to estimate Cs in plankton when there are direct measurements of this?

For the statement “The simple linear method based on the bioconcentration factor, defined as the ratio of the amount of radionuclide in the organism divided by the concentration in the water, is the most commonly used to assess the radionuclide concentration in marine biota (Buesseler, 2014)” Buesseler 2014 is the wrong reference for this statement.

Answer: The reference “Buesseler 2014” is replaced by “IAEA (2004)”

Question: Statement that photosynthesis plays a prominent role in regulation of radionuclide concentrations in primary producer populations - this is normally not true.

Answer:

Though various studies suggested that photosynthetic activity might be important in regulation of radiocesium concentrations in aquatic primary producers (Williams, 1960; Gutknecht, 1965; Yousef et al., 1975), others stated that phytoplankton presents radionuclide accumulation patterns similar to those of other nonliving suspended parti-

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cles in sea-water (Fisher, 1986).

References:

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- Yousef, Y. A., Padden, T. J. and Gloyna, E. F.: Diurnal changes in radionuclides uptake by phytoplankton in small scale ecosystems, [online] Available from: [http://inis.iaea.org/Search/search.aspx?orig\\_q=RN:6180719](http://inis.iaea.org/Search/search.aspx?orig_q=RN:6180719) (Accessed 19 February 2015), 1975.
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