Scientific significance: This is an inspiring paper which includes a dynamic pelagic food chain as well as benthic food chain. This is seldom seen in radioecology and hopefully opens up a world of new ideas in radioecology. At the same time it needs to maintain its connections to marine ecology, where the benthic and pelagic food webs have been studied for a long time. Thus it needs to be understandable both for radioecologist and marine ecologist, which can be difficult to achieve. Below are some comments how this can be improved.

The presentation quality of paper is good, well written and structured, even if the connection between the two sites seem to be only the model and Cs. I don't see any discussion or comparison what the difference is between the sites, just examples.

The scientific quality has a good appearance, but when looking closer to the supporting model and references the results are weak. There is simple to little data to support the modelling results (exemplified below) . Moreover the scientific nomenclature is not consistent with e.g. marine ecological nomenclature and exact description of e.g. species.

1. Although it is a step forward to include the foodchains, both the bentic and pelagic foodweb presented here miss the important microbial loops and even meiofauna. The microbial loop has been discussed the last three decades in oceanography and limnology (see review in Fenchel 2008 Journal of Experimental Marine Biology and Ecology 366 (2008) 99–103 . The depicted foodchain in figure 1 doesn't include and nothing is mentioned in the text. I can understand that there reasons not to include them in the model, but there a no reasons to omit them without explanation. This will certainly cause doubts of sound science of this paper by marine ecologist on this paper.

2. There are problems with the classifications in the paper of the different trophic groups discussed in the paper and shown in figure 1. They are not consistent and classification with the same variables. E.g what is a costal predator and what difference compared to piscivoures fish? The example given is cod. In the Baltic Sea it certainly would be regarded a Piscivorus fish you can everywhere not only coast. Algae (fig 1) and phytoplankton are the same, you maybe mean benthic algae or macroalgae. In table 1 you call it macroalgae Demersal fish and Benthic predator what is the difference? Example is given with European flounder which certainly is a benthic predator and demersal fish at the same time. In Fukushima we can read about Rockfish , what is that? There are least a dozen fish genera which can be called rockfish, they have different position in the food chain. This needs better description or at least the scientific (latin) name.

3. There are other filterfeeders than mollusc and mollusc can be grazers and deposit feeders. Benthic algae are consumed by grazer also. Why the difference between deposit feeding invertebrates and crustacean invertebrates Crustaceans are certainly many of the Zooplankton.

4. No explantion in figure 1 what are the arrows, boxes, dotted lines, where are the explantions of the categories. What are the numbers?The dotted box with a waterbox outside? Water deposit what is that and why is that box outside ?

5. Figure 2. What are deep water boxes ? What are coastal box? Describe or give citeria or point to text where that is described

6. Figure 3 Explain what the legend means e.g correction of wha?t . kg of what drymatter ?? Something strange that the estimated KD for the sediment is different before and after Fukushima, especially the before values the ratio seem low if you expect a KD of 1000 l/kg

7. The paper identifies that an important process is missing resuspension, and it is compensation with some unclear equations. In the Baltic Sea this certainly is a much more important process than e.g. diffusion. I can imagine that it could be important outside Fukushima especially since the organic content is so low (<25% line 50). Thus it would certainly lift this to a through discussion and conclusion, not just an equation fix.

8. Line 26 : What does the biomagnification effect mean here? See e.g. Gray 2002 Marine Pollution Bulletin 45 (2002) 46–52 Biomagnification in marine systems: the perspective of an ecologist

9. Line 50 says that it is bound to organic matter. It is unclear if that means dead matter och e.g microbes or both.

10. Line 66: What is an underground leakage in this context?

11. Line 109: I don't understand "rapid and more intensive transfer of several sediment adsorbed radionuclides to particular organs of the demersal fishes" in contrast invertebrates? Or as another source of contaminants?

12. Line 111: In this context I don't understand the role of macroalgae (and why not benthic microalgae) I would also assume that crustaceans and molluscs are able to graze the algae not only deposit feed. Moreover there no data about the macralgae and for me if the depth of the coastal box is 60m there must be large areas outside the photic zone. How is that estimated?

13. Line 130: Why not call the food abstraction coefficient assimilation efficiency which is the normal biological word

14. Lines around 155: Since the classification not very systematic the relationships between these fish types are unclear also.

15. Line 191 and forward: The description of the POSIEIDN model should be helped with an figure showing the compartments and where the additional food web interact with POSEIDON. Moreover the parametervalue for the two sites should be tabulated somewhere, without this information it is not possible to reproduce the results.

16. Line 204: An important transfer from sediment to water column is resuspension.

17. Line 210: shallow one layer compartment ? another sedimentlayer or a description of the sectors in POSEIDON? If the later wasn't that the same compartment as the pelagic food web?

18. Line 235: Somewhere I am missing a table giving the parameters of the model. Also a description of the average depth of the site and bottom substrate is missing

19. Line 275: Do you mean the geometric mean of the ratio? Between measured to observed values?

20. Line 293: …. "cannot account"… you mean maybe " not included in the model", it is not clear.

21. Line 294: it is not easy to understand where these terms are added into which equation. This addition seem crucial to the model and needs to be presented clearer and completely to be transparent. Moreover I get the impression that this is some sort of calibration to make the model fit for the measurements. Or how is it obtained?

22. Line 304: You mention sea urchin here, is that detritus feeding or a grazer in real life and what group is it represented in the model, invertebrate?

23. Line 306: Here you mention depuration constant for the first time. I am unsure if it can be called depuration constant at least from the ectoxicological viewpoint, moreover this constant could be mentioned the first time it occurs and explained what it is.

24. Line 309: What do you mean with transfer coefficient here ? Concentration ratio?

25. Line 311: What kind of polychaete, deposit feeding or filterfeeding, to unspecific without species name

26. Line 318: Reference needed for the experimental value or/and description of the experiment. Crucial is how they are fed and how the radionuclide is added

27. Line 322: What do you mean with biomagification effect (see earlier comment) and how should that affect the CR in demersal fish mechanistically?

28. Line 323: Again inexact species and categorisation, there are several genus called rockfish, what is the scientific name? How does it fit into the classification? Coastal predator?

29. Line 326: The legend to the figure could be put into figure text

30. Line 327-333: This is interesting results and probably support your approach, but it is messed up with inconsistent classifications. My suggestion that you first of all make a consistent classification, a clear description what that means and finally give examples of species in the area for each group. This should be done in methods, the you adhere to the classification when you mention different species with common and scientific names (latin) . I know that it can never become clearcut where different species belong, but you tell at least the reader where they are in the model.

31. Line 334: ".. which are known with high uncertainity." Maybe better … known to have a high…

32. Line 352: probably figure S3b not 3b

33. Line 355: why this different numbers ?

34. Line 363: also probable wrong figure number

35. Line 363-384: I would suggest to omit this part, there are assumptions and limits with different relevance in different parts of the world. From my horizon (responsible for dose assessments) I cannot see the point of this section. Omit it the aslo from conclusion

36. Line 385-410: If the modelling of the Baltic sea should be useful, this section should at least tabulate the drivers (fluxes over borders) and parameter values for the modelled box for the result. It is not reproducible with the current information. I am also missing general data on the bathymetry and which species are considered in the model foodweb.

37. Line 440: Polychaete feeding is that valid for the Baltic Sea

38. Line 459: As commented earlier the classification system needs to be reworked

39. Line 464: Suggest to omit "strongly", it is not relevant for the Baltic Sea and I don't think I adds something more for Fukushima area.

40. Conclusion or discussion I am missing a more rigorous comparision between the Baltic Sea and Fukushima, otherwise I don't see the point include both in this paper.

41. No explanation in figure 1 what are the arrows, boxes, dotted lines, where are the explanations of the categories. What are the numbers? The dotted box with a waterbox outside? Water deposit what is that and why is that box outside ?

42. Figure 2. What are deep water boxes ? What are coastal box? Describe or give criteria or point to text where that is described

43. Figure 3 Explain what the legend means e.g correction of wha?t . kg of what drymatter ??
44. Figure 5 explain color-coding
45. Figure 6 is the concentration in bottom sediment for the bul sediment or organic fraction (the same question applies for Fukushima)
46. FigS3 There no figtext for d)