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Discussions

# *Interactive comment on* "Short-term dispersal of Fukushima-derived radionuclides off Japan: modeling efforts and model-data intercomparison" *by* I. I. Rypina et al.

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Rypina et al.'s manuscript addresses the dispersal of the introduced dissolved substances based on the field data collected from the scientifically well designed field sampling campaign and state of the art numerical modeling of the water movement in the ocean and its conservative analysis of the model outcomes. This manuscript demonstrates that the basic oceanographic research is very useful to understand the scene of the aftermath of the nuclear power plants located in the coastline in the world, if the accident occurs.

Number of important findings, such as dissolved substance is not readily entrained



into the core of the eddy and strong ocean current can form an effective barrier for the dispersal of dissolved substance, should be recognized and will lead to further scientific inquiry.

Operators of the seashore based nuclear power plants or other hazardous installations should invest to the probable dispersal pattern if accidental discharge of dissolved substances from the plants using this manuscript as a model. Therefore, this manuscript deserves a close scrutiny for the practical point of view as well as scientific point of view.

A few points may be offered to the authors to providing balanced view on their data.

The distribution of 137Cs in the particulate phase should be mentioned although it is very small and may not affect the model results.

Page 1530 Line 5 The manuscript says "As a large part of the initial fallout distribution of 137Cs lies south of the Kuroshio," but a number of literatures said a large part of the atmospheric emission directed to the northeast, that is, north of the Kuroshio (e.g., Lozano et al., 2011. Environmental International; Stohl et al., 2012; and others). If it is true, then, the authors should provide the reference to it.

Page 1532 Line 1. If the authors could elaborate the mechanism of why dissolved substances are not mixed into the interior of the eddy for about 3 months time periods. That would be very useful for further studies.

Page 1532 Line 9: "homogenization". Homogenization may be an over simplification of the reality. The chemical composition of the seawater in the ocean is rarely homogeneous over this large area over several degrees in latitude and longitude. Therefore the sentence needs to be corrected.

Page 1532 Line 10: "station by station comparison": The discrepancy between measured and simulated values becomes greater after station 28 to 52. A little bit of elaboration on this feature need to be addressed in the manuscript.

Minor points

Page 1524 Line 16: In the manuscript, half-life of 137Cs was given as 30.16 yr, however, other literature says 30.05 (e.g., Monographie BIPM-Comments Vol1-4, 2008) or 30.02 yr (Table of Radioactive Isotopes by E Browne and R Firestone, 1986, Wiley-Interscience). Although the difference may not change the outcome of the manuscript, it is still useful for some other purposes.

Page 1526 Line 28: "Note that once 137Cs is mixed down to a certain depth, it gets advected laterally by currents at depth and does not collect back to shallower depths as the mixed layer shoals." This sentence may need to be rephrased to assist the reader to understand the underlying physics. Such as "Once 137Cs is mixed down to a certain depth, and the 137Cs at that depth will remain if the mixed layer becomes shallower than that depth, due to heating at the sea surface (?). And the 137Cs at that depth gets advected by currents at that depth dispersed through isopycnal mixing in lateral direction as well as vertically."

Sampling stations are not found in the figures. Therefore, appropriate station map showing all the oceanographic sampling station numbers is needed.

Figure 6: Location of the Kuroshio may be inserted for the readers to see the concentrations at certain locations in relation to the position of the Kuroshio.

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