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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modelling the global atmospheric transport and deposition of radionuclides from the Fukushima Dai-ichi nuclear accident" *by* T. Christoudias and J. Lelieveld

Anonymous Referee #1

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The paper provides new knowledge and inovative results. Therefore, it would deserve publication in the journal ACP. Before that, there are several corrections and/or clarifications that are essential to be done by the authors. After that the manuscript should reconsidered.

The major comments on the manuscript are the following:

-Page 2 - Session 2.1: "These factors and a number of other assumptions ... of five.": The paragraph starting from the previous sentence needs more work in order to be more comprehensible. For example, do you report the factor of five based on this work or you just explain the paper of Chino et al. (2011)? Please explain.

-Page 3 - Session 3.1: "Only 20-50% of ... unattenuated." Please provide evidence for the fraction of Iodine being scavenged by filter papers (1-2 publications) in order you to prevent speculative characterisation of your statement.

-Page 3 - Session 3.1: "The highest concentration of Xe ... to be accurate." Please provide more analysis here. What do you mean by dynamic range and why detections larger that 100 Bq m-3 are inaccurate? It is not clear.

-Page 3 - Session 3.1: "It is also known ... after the accident." Please provide references or other evidence abou that station's condition. Please explain what you mean by dead time. You need to do the same for the next sentence: "The Japanese particulate ... 2011." Also, for the stations JPP38 and USP71. The details you provide are not known and it would be useful to have a reference that certifies them.

-Page 4 - Session 3.1: "The greater extend to which deposition ... transport." Please explain the sentence in order to be more comprehensive.

-Page 4 - Session 3.1: "Furthermore, ... Chino et al. (2011)." I recommend you to do the same as in the 2nd comment.

-Page 5 - Session 3.2: "We estimate that the land area ... 46 million people". In this part it would be very important to work on a better mapping. For example, you mention several cities (Sendai, Yokohama, Chiba, Tokyo), which are not shown in the figures of deposition as they should. Please change.

-Page 5 - Session 3.3: LAST PARAGRAPH: You calculate the 50 year ground deposition doses for Cs-137 and I-131. Normally, your main assumption in the calculations would be a stable environment that does not change due to vertical migration of radionuclides or other processes (e.g. washout, runoff etc...). And I agree with you that it is more or less an accurate estimate for cesium, which has a 30.2 years halflife. However, how do you account for the decay of I-131 in the formula you used for the dose calculations? According to my estimations, given that the halflife of I-131 is 8 days,

you may have overestimated your doses up to 50%. Please explain or remove doses based on Cs and I.

-Fig.5, Fig.6 and Fig.7: Please re-create these figures in order the units to be in kBq/m2 since these depositional units you mention in the manuscript. This is crucial for the coherence of your manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24531, 2012.