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Comment

Interactive comment on “Atmospheric removal times of the aerosol-bound radionuclides ^{137}Cs and ^{131}I during the months after the Fukushima Dai-ichi nuclear power plant accident – a constraint for air quality and climate models” by N. I. Kristiansen et al.

Anonymous Referee #1

Received and published: 7 August 2012

General Comment This paper is probably the first one which surveys the residual time of radionuclides discharged by the Fukushima Daiichi Nuclear Power Plant accident. Although the originality is not sure as the method to estimate removal times of AM aerosols using radionuclides in the environment, the viewpoint is good. To evaluate the originality of this paper, you should care the references.

The comments for specific lines are as follows:

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Lines 1-7, p.12333: The reference about the characteristics and health effects of I-131 and Cs-137 would be helpful for readers' understanding.

Lines 7-8, p.12333, "¹³⁷Cs determines the long-term effect of a nuclear accident": Is it because of its long half-life period?

Lines 9-11, p.12333, "These radionuclides attach mainly to the ambient accumulation-mode (AM) aerosols": this is not correct because I-131 also exists as gaseous phase as the authors mentioned.

Lines 28, p.12333, "The gaseous release fraction is typically as high as the particulate fraction": please add the reference, otherwise show observed data on gaseous and particulate fraction during the accident.

Section 2, p.12337-12338: is the method to estimate removal times firstly used in this paper, or does it rely on many published papers introduced in p.12345? If it is a commonly used method, add the references here.

Lines 14-15, p.12336: I think half-life should be inserted in Section 1 instead of here.

Lines 26, and 29, p.12336: please address temporal behavior of I-131 and Cs-137 from the recent paper of Katata et al. (2012a) which re-estimated the release rate from March 12 to 14 on 2011.

Lines 5-6, p.12340, "affected by strong wet scavenging due to tropical precipitation": the readers could easily imagine the sentence if the authors show, for example, the distribution map of total precipitation as Fig. 1.

Lines 1-11, p.12342: regarding gas-particle conversion of I-131, there are comprehensive dataset in Europe provided from Masson et al. (2011) and past study related to gas/particle separation of Uematsu et al. (1988). Both studies may support the authors' presumption.

Lines 12-24, p.12342: The recent study of Terada et al. (2012) summarizing source

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term revised from Chino et al. (2011) may change the authors' results to some extent.

Lines 3-4, p.12343, "Unfortunately, the initial phase of plume dispersion was not sampled by the CTBTO network and it is therefore not possible to derive removal rates or lifetimes for the first few days after emission": The report of Ohkura et al. (2012) that shows the temporal data in gaseous and particulate I-131 concentration in Japan may enable your discussion.

Lines 8, p.12343, "thus facilitating effective dry deposition": the fact should be supported by the related paper of Katata et al. (2012b).

Lines 5, p.12344, "which received 90% of the FD-NPP fall-out over 5 land": has it been estimated by numerical simulation?

Lines 28, p.12344, "distributed": mixed?

Lines 10, 17, p.12347: please add a period to the end of sentences.

References Katata et al. (2012a) "Atmospheric discharge and dispersion of radionuclides during the Fukushima Dai-ichi Nuclear Power Plant accident. Part I: Source term estimation and local-scale atmospheric dispersion in early phase of the accident", J. Environ. Radioact., 109, 103-113.

Katata et al. (2012b) "Numerical reconstruction of high dose rate zones due to the Fukushima Dai-ichi Nuclear Power Plant accident", J. Environ. Radioact., 111, 2-12.

Masson et al. (2011) Tracking of Airborne Radionuclides from the Damaged Fukushima Dai-ichi Nuclear Reactors by European Networks. Environ. Sci. Technol., 45, 7670-7677.

Terada et al. (2012) "Atmospheric discharge and dispersion of radionuclides during the Fukushima Dai-ichi Nuclear Power Plant accident. Part II: verification of the source term and analysis of regional-scale atmospheric dispersion", J. Environ. Radioact., 112, 141-154.

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Uematsu et al. (1988) Aerosol residence times and iodine gas/particle conversion over the North Pacific as determined from Chernobyl radioactivity, *Geochem. J.*, 22, 157-163.

Ohkura et al. (2012) Emergency Monitoring of Environmental Radiation and Atmospheric Radionuclides at Nuclear Science Research Institute, JAEA Following the Accident of Fukushima Daiichi Nuclear Power Plant, JAEA-Data/Code 2012-010, Japan Atomic Energy Agency. <http://jolissrch-inter.tokai-sc.jaea.go.jp/pdfdata/JAEA-Data-Code-2012-010.pdf>

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 12, 12331, 2012.

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