Referee 2

Comments from Referee	Author's response	Author's changes in manuscript
The Introduction does not conclude with a clear statement of the aims of the study that are justified by the preceding text. By the end of the Introduction the reader understands that you intend to investigate the depth distribution of caesium^{-137} in the area of fallout, but it is not clear how you will draw more broad conclusions on the processes governing migration and cycling that would have significance for other studies beyond your own.	Introduction was modified to justify the need of conducting our study in paddy fields that may be composed by Andosols that have been partly mixed with other soil types to form what is now called 'reformed soils'.	The main soil type found in paddy fields located in the main contamination plume is Andosol (Endo et al., 2013; Nakao et al., 2014; Takeda et al., 2014, MLIT), characterized by high levels of organic matter (Kamei-Ishikawa et al., 2008; Takeda et al., 2004). Takeda et al. (2014) showed a low adsorption of radiocesium in soybean fields composed of Andosol by determining the Radiocesium Interception Potential (RIP) that caracterised the capacity of the soil to adsorb radiocesium on the Frayed Edge Sites (FES). These low RIPs (0.32^{-1}.78 mol.kg^{-1}) could be due to the high amount of amorphous minerals (absence of a defined crystalline shape - e.g. allophane or imogolite) in these soils (NIAES 1996; Vandebroek et al., 2012). Other studies conducted in the vicinity of the accident showed that several Andosols were characterized by a higher RIP (2.22-7.10 mol.kg^{-1}) and could be referred to as Reformed soils (Fan et al., 2014; Takahashi et al., 2014). According to the Prefecture of Fukushima (1988 cited by Takahashi et al., 2014), many Andosols were covered with other material and could now contain minerals that retain radiocesium (NIAES, 1996). In addition, irrigation with river water could supply particles and minerals from upstream mountains to these fields (Nemoto et al., 2013). Therefore, 30 months after the accident, it is crucial to investigate the specific migration of radiocesium with depth in a selection of Andosols located within the main contamination plume of Fukushima Prefecture. This investigation of radiocesium migration in paddy fields is particularly timely in the current post-accidental phase characterised by the implementation of large-scale remediation efforts targeting paddy fields. The implications of these findings for contamination transfer to crops and potential soil erosion will be specifically discussed.

Although the Fukushima Dai-Ichi Nuclear Power Plant accident is clearly significant the findings that caesium^{-137} cycles within the upper layer of the soil is not novel – this was shown previously in relation to Chernobyl fallout (in the UK) based on models of caesium dynamics (Absalom et al 2001). The introduction needs to consider earlier work on Cs^{-137} turnover at other sites of radioactive contamination that pre-date Fukushima Dai-Ichi.	References dealing with ^{137}Cs turnover were added (Beck 1966, Ivanov et al., 1996). Please note that the main topic of this paper is to investigate migration of ^{137}Cs in paddy fields. This type of field, mainly found in Asia, has not been investigated following Chernobyl accident, and it is therefore crucial to study the ^{137}Cs migration in severely contaminated paddy fields.	
In the study you apply equations to determine the inventory of caesium^{-137} but this is not referred to specifically in the introduction - who has applied these equations previously to which sites (beyond the current study) and what are there advantages and disadvantages?	Equations used in this paper are commonly used in the literature to describe the mobility of ^{137}Cs in soils since several years (see references provided in section 2.4). These equations were mainly used after Fukushima accident and published results are compared in the section 3.	
The study needs a more comprehensive consideration of the relative importance of mineral versus organic matter related adsorption/interception of caesium^{-137}. For example, you need to consider the work undertaken by Gil Garcia et al (2009). This work and others have suggested that mineralogy is likely to be the dominant influence on RIP, not organic matter concentrations or interactions between OM and minerals. Do you have any information on the mineralogy of these soils (which may determine RIP more than organic matter content) that could be included in the analysis (e.g. illite content is important for RIP). If not, why was mineralogical analysis undertaken as part of the study. For example, Absalom et al (1995) showed that mineral dominated soils adsorbed more caesium than organic soils.	The aim of the paper was not to investigate the adsorption process of radiocesium in soil but to document its migration in paddy fields almost three years after the accident. In this region, most paddy fields are installed in zones covered with Andosols and it has been shown that migration could be higher in this soil type. However, several studies showed that Andosols found in this region are not only composed of amorphous minerals but they also contain minerals adsorbing radiocesium such as illite and must therefore be considered as 'reformed soil' (Takahashi et al., 2014).	

There are numerous small grammatical errors which requires a native speaker to correct before the paper can be accepted.	The manuscript were corrected by a native speaker and many corrections were added to the text.	
Abstract Line 16 - replace maintenance with grass cutting and tilling with tillage	Corrected	We attributed the maximum depth penetration of ^{137}Cs to grass cutting (97% of ^{137}Cs in the upper 5 cm) and farming operations (tillage – 83% of ^{137}Cs in the upper 5 cm).
Line 19- over what area are you recommending removal and what are you suggesting authorities do with this soil material to minimise human exposure to radiation?	We recommend to remove at the first 15 cm of surface soils for fields characterized by radiocesium activities > 10 000 Bq kg^{-1}. Our study does not investigate solutions to minimize human exposure to radiation. Anyway, one solution would be to take away the contaminated soil far from inhabited zones.	
Line 24 - what does 'on river channels' mean - by river channels?	Rephrased	Further analysis is required to thoroughly understand the impacts of erosion on the redistribution of radiocesium throughout the Fukushima Prefecture.
Main text p 403 Line 13 - what is the exposure pathway - direct exposure to gamma radiation from the soil or consumption of contaminated foodstuffs? Later in the text you make gamma exposure measurements but you need to make it clear in the introduction that this is the exposure pathway you are considering.	The main exposure pathway is the direct exposure to gamma radiation from the soil. This information was added.	Therefore it is crucial to understand and monitor the fate of the initial radioactive deposits in order to protect the local population against exposure to high dose rates due to gamma radiation that may prevail in areas accumulating contamination.
Line 22 - affected to a limited extent is better.	Corrected	Dispersion of contamination originating from paddy fields along the rivers of the region could therefore contaminate downstream areas that were affected to a limited extent by the initial fallout
p404 line 2 large concentrations of organic matter.	Rephrased	However, it was also shown that in soils with high levels of organic matter, radiocesium may migrate down the soil profile as organic matter may reduce its affinity with clay minerals (Kamei-Ishikawa et al., 2008; Koarashi et al., 2012; Staunton et al., 2002; Szenknect et al., 2003).

line 9- Why should depth migration be specifically investigated in these soils – this statement needs to be justified. It is not self evident.	The aim of the paper was to investigate the migration of ^{137}Cs in paddy fields that may be exposed to soil erosion. Paddy fields in this area are mainly located in areas covered with Andosols that are generally known to have a relatively low adsorption capacity for ^{137}Cs. In Japanese literature we found that Andosols were modified by human activities and that most soils can now be referred to as 'reformed soils'. In this context, it is important to investigate the migration of ^{137}Cs in these fields and to check if radiocesium remains concentrated in the top layers of the soil or if it has migrated further in depth.	
line 10-12 Would a large proportion of amorphous minerals result in a low RIP if there was a large proportion of other mineral phases that had large RIP values?	RIP is an intrinsic property depending on the soil type and the presence of amorphous minerals that could dilute the micaceous fraction and thus reduce Cs adsorption. Although the presence of amorphous minerals could result in low RIP values, other parameters should be taken into account such as the organic matter content, and the presence of quartz or oxides.	
line 14 - you make it clear here that soil to plant transfer is important of a RIP for understanding exposure, but you do not suggest undertaking any assessment of RIP values in relation to previous work - why did you not consider measuring RIP as a means of understanding the processes governing the fate of Cs^{137} in these soils?	Determining the RIP does not provide a way to quantify the inventory of ^{137}Cs with depth in the soil (i.e., our objective in this paper) but it rather provides information about the capacity of the soil to retain ^{137}Cs (i.e., a very interesting but different research objective).	
p406 It is not clear how many sections of soil this procedure yields: 'The soil cores were subsectioned into 1 cm increment layers for the uppermost 5 cm, and into a 5cm interval to a depth of 10 cm.'	Rephrased to clarify	The soil cores were sub-sectioned into 1 cm increments for the uppermost 5 cm and an additional 5 cm increment was taken from 5 cm to 10 cm.

Figure 6 - is this cumulative rainfall? It appears to show rainfall for each rainfall event, but not accumulated?	This is not cumulative rainfall but daily rainfall, data was corrected in Figure 6 (and caption)	Figure 6. Daily rainfall between FDNPP accident and this sampling campaign. Occurrence of typhoons is indicated on the graph.
p412 line 22-25 - this needs redrafting as it currently too long and loses its meaning	This sentence was reformulated	The maximum depth penetration of ^{137}Cs collected in November 2013 was attributed to maintenance and farming operations in paddy fields contaminated after the FDNPP accident (March 2011). In tilled fields, the contamination showed a similar level in each layer ($0^{-1}0$cm) while in managed field, where vegetation was removed, contamination only migrated down the first 3 cm.
lines 3-7 - these are not conclusions from your study, they are suggestions based on your inference that bare soil will erode more easily. You have not shown that soil is more erodible when decontamination works are underway so this should be left in the discussion and not repeated here.	These sentences were removed from the conclusions.	