Reply to Reviewer-#1

We appreciate the useful comments for further improvements of the manuscript. Below are shown your comments (in italics) and our response comments (in bold).

<Comment-1>

page 13786, line 23: some text is missing after "... which for 137-Cs" (add the value of half life).

We will correct as follows:

'A constant value $\lambda = \ln(2)/T_{half}$ $\left(T_{half} = 30.1\text{years}\right)$ represents the half-life time decay effect of the radionuclide for ^{137}Cs.'

<Comment-2>

Equation 2: this represents the boundary condition of equation on the sea surface. Thus please add in the left side of equation 2 that the derivative o C respect to z is evaluated at the surface.

We will correct as follows:

$$K_v \left.\frac{\partial C}{\partial z}\right|_{z=\eta} = D_a{}^f(x, y, t) \qquad (2)$$

where K_v is the vertical diffusion coefficient and $z = \eta$ is sea surface level.'

<Comment-3>

page 13788: is JCOPE-T what is called later JCOPE-T-1? please use the same names.

<Comment-4>

page 13791, line 13: again JCOPE-T is mentioned. Is it JCOPE-T1?

Yes, these 'JCOPE-T' should be called as JCOPE-T-1. We will modify the text to distinguish the difference between JCOPE-T-1 and JCOPE-T-2.

<Comment-5>

equation 5: the same as for equation 2.

We will correct as follows:

$$K_v \left.\frac{\partial C}{\partial z}\right|_{z=\eta} = (O_a + S_a) D_a{}^f(x, y, t), \qquad (5)'$$

Thanks for the careful reading.

<Comment-6>

Section 4 and table 3: it is not clear how the optimization is carried out, at least I cannot understand it and would appreciate if can be explained more clearly. It is said that two sensitivity experiments are made, perturbing Sa and So. Why there are 4 columns of results in table 3? Moreover, which is the difference between ocean-multiple and atmosphere-multiple, if multiple means that both parameters are used?

The description relevant to this topic, beginning at line 7, p13794, in the discussion paper is as follows:

'Optimizations of multiple parameters for the direct release and atmospheric deposition (see second and third columns of Table 3) generally exhibit more reduction of the expected cost values than optimizations for either single parameter (see fourth and fifth columns of Table 3).'

We will modify the description as follows:

'Green's function approach allows to evaluate optimal values for each single parameter separately, while it also allows to evaluate optimal multiple parameters simultaneously (Menemenlis et al., 2005). Optimizations of multiple parameters for the direct release and atmospheric deposition (see second and third columns of Table 3) generally exhibit more reduction of the expected cost values than optimizations for either single parameter (see fourth and fifth columns of Table 3).'

<Comment-7>

caption to table 3: a new name appears here: JCOPE-T-2-C-E, please add a star to refer to the note below the table.

The JCOPE-T-2-C-E case denotes the cost function value (Eq.4) resulting from the actual simulation of JCOPE-T-2-C, not the expected cost function value (Eq.10). To clarify the difference between JCOPE-T-2-C-E (the actual cost function value) and JCOPE-T-2 (the expected cost function value), we will modify the description beginning at line 21, p13796, shown below:

‘The cost function value of this simulation, 207967, is quite similar to the expected value (207099), suggesting the effectiveness of the Green’s function approach in the optimization of these parameters.’
,as following:

‘The cost function value of this simulation JCOPE-T-2-C-E, 207967, is quite similar to the expected value (207099), suggesting the effectiveness of the Green’s function approach in the optimization of these parameters.’

The caption of Table 3 will also be modified to clarify this issue.