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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Reciprocal Green's Functions and the Quick Forecast of Submarine Landslide Tsunami" *by* Guan-Yu Chen et al.

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The comments given by the referee are highly appreciated. Most language problems indicated in the comments have been fixed, but "an" SMF is used because "s" starts with a vowel. The statement on the 2018 Sunda Strait tsunami has been removed. The calculations of GF and RGF are exactly the same except for the initial conditions, as has been explained on Lines 134-135.

A brief explanation has been given on Lines 136-151 in two paragraphs to explain why the dispersion effect due to short length scales of GF/RGF is neglected. These two paragraphs are as follows:

As the length scale of both GF and RGF is small, it may be wondered if the asso-

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ciated wavelength is not much longer than the water depth and the dispersion effect should be included. Here the applicability of GF/RGF in a shallow water system will be briefly discussed. The length scale is used to determine the order of magnitude for every physical quantity governing the movement of the ocean. By assuming very large horizontal length scales, nonhydrostatic dispersion can be shown to be negligible and Navier-Stokes equations can be simplified to SWEs. Therefore, by applying SWEs only the dynamics in an ocean which has no nonhydrostatic dispersion is the focus. A GF/RGF of SWEs is the response of this nondispersive ocean due to an initially elevated concentrated volume, without recourse to how a real ocean will respond to it. Since the GF/RGF of SWEs can be used to construct the complete solution like eq. (12), it is a useful mathematical tool in the present study. The dispersion effect is not considered in the present study because including the dispersion of GF/RGF will not improve the tsunami solution in any way.

A similar question on length scale is also frequently encountered in solving SWEs by finite difference or other numerical schemes. The grid size in discretizing the SWEs is also a length scale, but it is not necessary that each grid be much longer than the water depth. A shorter grid size does not imply the length scale assumption for SWEs is violated, because the focus is only on the dynamics in a nondispersive ocean. Thus, finite difference and other numerical schemes are also useful mathematical tools in solving SWEs. In fact, if a grid size much larger than the water depth is insisted on, then a solution of acceptable accuracy can never be obtained.

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