

Interactive comment on “A Python framework for efficient use of pre-computed Green’s functions in seismological and other physical forward and inverse source problems” by S. Heimann et al.

Anonymous Referee #2

Received and published: 18 July 2019

This is a well-written technical paper. The code and the web service look well-established for user applications. But two points are not clear to me.

1. model assumption, 1D/2D/3D?

In Section 2.2, the authors present the theory for layered models, for which we can take advantage of the four radiation patterns of the wave solution, i.e., eq.8, the same as those in Nissen-Meyer et al. 2007.

First, the correctness of Section 2.2 does not necessarily require the model to be layered; it only requires the model to be axisymmetric with respect to the source, that is, $V_s(r, \theta, \phi) = V_s(r, \theta)$, sometimes referred to as 2D in-plane models. A layered

C1

model is a stronger assumption: $V_s(r, \theta, \phi) = V_s(r)$, or a 1D model.

It is not clear if their code is designed only for 1D layered models or it can deal with 2D in-plane models or even an arbitrary 3D model. The authors mentioned Crust 2.0, which is inherently a 3D model. On their website, I see they have computed GF's for 1D profiles of Crust 2.0.

Does the code support both spherical and Cartesian geometry (for local)? Pressure source in a fluid ocean? ...

The model assumptions and requirements for the code should be made explicit in the abstract and conclusion.

2. comparison with Instaseis/Syngine

About Instaseis/Syngine, the authors wrote

"However, these rigid database schemes are restricted to the modelling method that has been used to create them, and they are confined to specific moment tensor applications."

"specific moment tensor" may not be correct. As a user of Instaseis/Syngine, so far as I know, Instaseis and Syngine accept an arbitrary moment tensor (based on eq.8) and Instaseis can also handle point forces (for receiver-wise reciprocity database).

Because their contribution has a similar purpose and follows similar principles to Instaseis/Syngine, its advantage and generalisation should be correctly and clearly explained. Two advantages seem clear to me: an Instaseis database can be generated only by AxiSEM, while a Pyrocko database is compatible with any forward simulation methods, as claimed by the authors; besides, Instaseis/Syngine is only for global scale.

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2019-85>, 2019.

C2