

# Sanity checks of the ensemble model (STEP 4)

## 1. Introduction

In order to build the ensemble, out of all the available models in the alternatives tree at each STEP/LEVEL of the assessment, we sampled 1000 alternative models proportionally to the credibility weight, as quantified through the second expert elicitation. Here, we check the consistency between the sample of models used in the final ensemble and the weights. This check is made using independent scripts.

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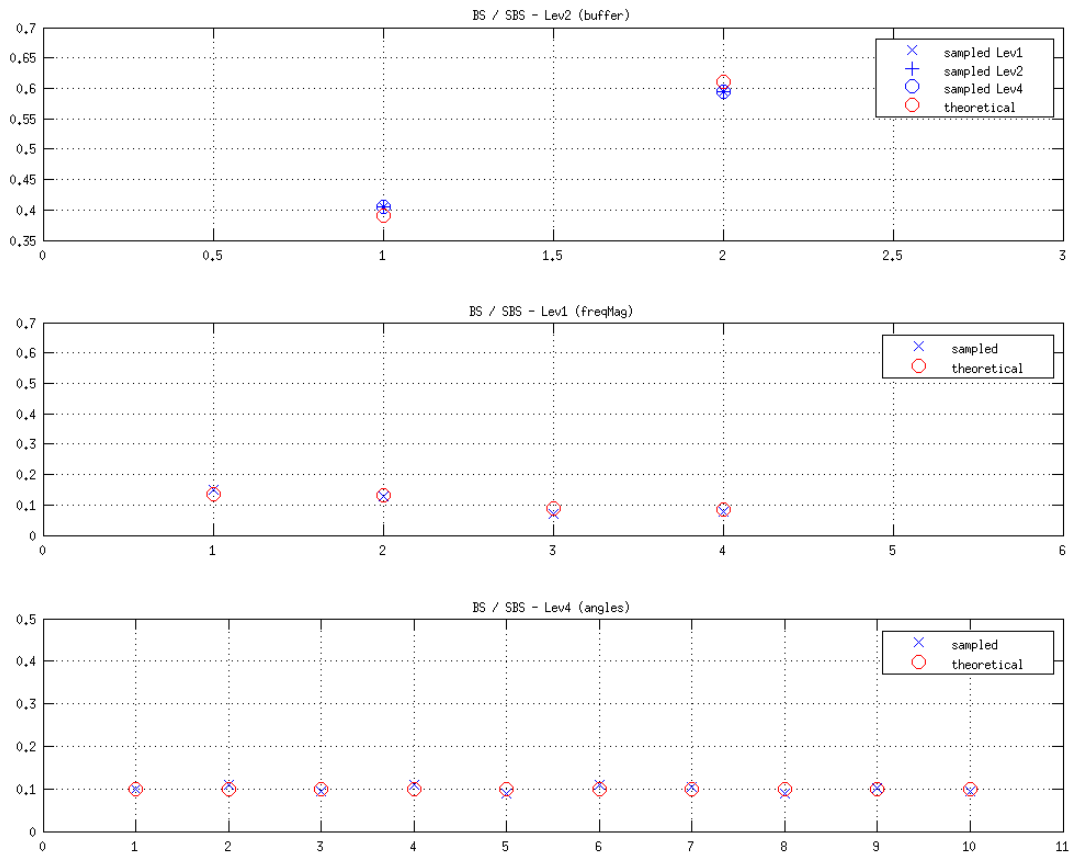
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### 3. Results

In Figure 1, we report the sanity checks for the Prevalent Seismicity (PS). As discussed in the methodology document, the 2 alternatives of level 0 (regarding the buffer around the fault interface to separate PS and BS) do propagate to all the other levels, and the sampling should be coherent among the different levels. In Figure 1, upper panel, it can be seen that indeed the sampled fraction of Alternative #1 and Alternative #2 at all levels is identical. At level 1, there are 5 alternatives, relative to the magnitude frequency distribution. The first 4 alternatives are relative to the joint computation for BS and PS, considering different shapes (Tapered vs Truncated) and strategies for computing the b-value (either from data or set to 1). The last alternative includes all the Davies et al. (2016) alternatives (and relative weights) that are here jointly weighted as one alternative (independent BS/PS quantification). At level 2b, there are 8 alternatives that combine 2 scaling laws (Strasser/Murotani), 2 strategies for modelling the upper part of subduction interfaces (propagation allowed/not-allowed), and 2 methods for modelling their rigidity (uniform/depth-dependent).

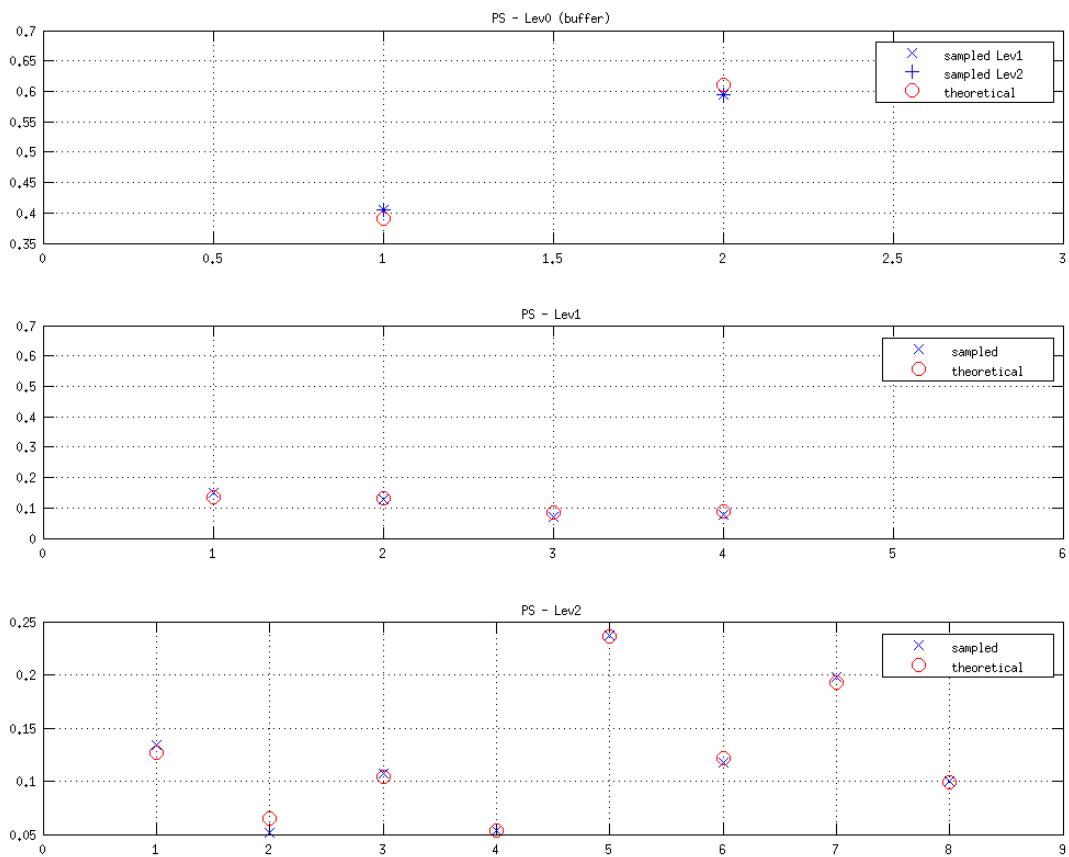
*Figure 1: Sanity check for the ensemble's sampling for PS sources. We compare the fraction of the 1000 sampled alternatives in the ensemble and the respective theoretical weights of the alternatives for (upper panel) STEP 1 - Level 0 regarding the buffer around the fault interface to separate PS and BS, (central panel) STEP 1 – Level 1 regarding the magnitude-frequency model, (lower panel) STEP 1 – Level 2a regarding distributions of potential fault areas in the PS interfaces. More details can be found in the text.*



In Figure 2, we report the sanity checks for the Background Seismicity (BS). The upper and the central panels are relative to levels 0 and 1 for BS and they are the equivalent for BS of the ones of

Figure 1, relative to PS. The results should be identical, as they are. The lower panel is relative to STEP 1 – level 4, relative to the focal mechanisms of BS. The alternatives in this case arise from a Bayesian sampling of model's parameters, with the same size of the target sampling (1000). Here, we check that these sampling are equiprobable as they should be. To do this, we grouped the 1000 sampled models in 10 groups (with 100 models each inside) and we checked that their frequencies are consistent with 1/10.

*Figure 2: Sanity check for the ensemble's sampling for BS sources. We compare the fraction of the 1000 sampled alternatives in the ensemble and the respective theoretical weights of the alternatives for (upper panel) STEP 1 - Level 0 regarding the buffer around the fault interface to separate PS and BS, (central panel) STEP 1 – Level 1 regarding the magnitude-frequency model, (lower panel) STEP 1 – Level 2b regarding distributions of focal mechanisms. More details can be found in the text.*



#### 4. Summary

All the observed frequencies are coherent with the theoretical value obtained from alternatives' weights in all cases.