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DELIVERABLE

D25.3 Seismic source model for ESHM18

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Reviewers	-
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Summary – Note to the Project Management and EC officer

In this contribution, we plan describing the seismogenic source models for the 2020 updates of the European Seismic Hazard Model (ESHM20).

Note, that the following documentation is not not intended as a complete scientific description of the seismogenic source model but rather an update of the current JRA3 activities under this task. The rationale behind the delay of this deliverable as well as a summary of the main activities undertaken within this task are the following:

- The SC8 requests for the 2018 ESHM model were shifted for 2020. A reference pan-European hazard map will be accepted as an input to the next generation of the Eurocodes standards if the acceptance of the members is met. This new request shifted the data collection and analysis, as well as the model building. In fact, the new time frame enables further data collection, and scientific advance within other JRA (2 and 4)
- The building process begins and rely upon data collection (earthquake catalogue, active faults, ground motion models) and analysis (catalogue declustering), collection of national models and relevant peer-reviewed manuscripts to reconcile with the ESHM13 components, model integration and hazard calculation.
- Given than some of these datasets (SERA WP25 D25.2) are delivered within the same time with this deliverable, there are components of the seismogenic source model that could not be completed within the time frame allocated to this deliverable: i.e. delineation of area sources to capture the new active faults in the region; statistical analysis of the earthquake catalogue, verification of the maximum magnitude, etc.
- As a part of the model building in ESH20M the area source model is built upon available local and regional models as well as newly constructed source zones. The ESHM13 seismogenic source model, original tools and datasets were collected and re-installed in the relevant servers. Reproducibility of these inputs (activity rates calculators, declustering algorithms) is a key aspect as these models were derived by experts that are not part of the SERA JRA3 modelling team.
- A shared folder containing the ESHM13 main datasets and relevant tools to recompute and analyse the seismogenic source model was provided to the main partners. New interactive tools are underdevelopment and used by members of the modelling team to analyse the updated datasets (deliverable D25.2). Such tools are built in Python, Jupyter Notebooks and OpenQuake hazard libraries.
- Seismogenic source models have been compiled for national model, including: Spain, Belgium, Germany, Switzerland, Slovenia, Romania, Turkey, Macedonia; Contribution for Northern Africa were obtained from the most recent fully harmonised regional source models derived together with Global Earthquake Model.
- A new model was developed for Eastern Europe – Belorussia, Moldova, Western Russia, Ukraine as a contribution to the global mosaic of hazard models of GEM. This model will be use in the updated seismogenic source model of the ESHM2020.
- The updated version of the ESGM2020 seismogenic source model is given in Figure 1. Note that the harmonization process applies at the level of datasets, not at the results level. Hence, accounting of epistemic uncertainties for model components is required. A logic tree will be considered – in fact the logic tree of the ESHM13 will be revisited. The aim is to obtain a balance between the input uncertainties and the robustness of the hazard results. The two branches levels of the ESHM13 logic tree will be preserved i.e. *the seismogenic source model* and the *ground motion characteristic model*. The former is presented in this deliverable whereas the

latter is documented by the D25.4 (updating the GMPE logic tree). The seismogenic source model of ESHM13 was built upon three source models – an area source model, active faults and the background zone, and smoothed seismicity model. It is foreseen that are a source model will be retained and updated, and the active faults will be combined with the smoothing seismicity model.

- The seismogenic source model will be discussed and reviewed by JRA3 modelling team in a workshop planned on December 5th in Milano.
- Four meetings/workshops will be organized in spring (March to May) to review and discuss the implication of the seismogenic source models to the hazard results. The review process must involve the key regional experts, either the authors or the latest national seismic hazard models, or those responsible with the development of the EC8 National Annexes.
- *The final report of the model will be delivered in M22* together with the relevant documentation, access to the datasets, analysis results and hazard calculation output. A set of interactive tools (i.e. catalogue analysis, activity rates, ground motion trellis plots) will be provided to support the review.
- It is worth mentioning that the final model of the seismogenic source model, as well as the final results are subject to revision from the national representatives well as the SC8 technical committee. Within the review process it shall be expected that the model will evolve until late 2019, thus the current documentation will be augmented with the review feedback and/or recommendations.

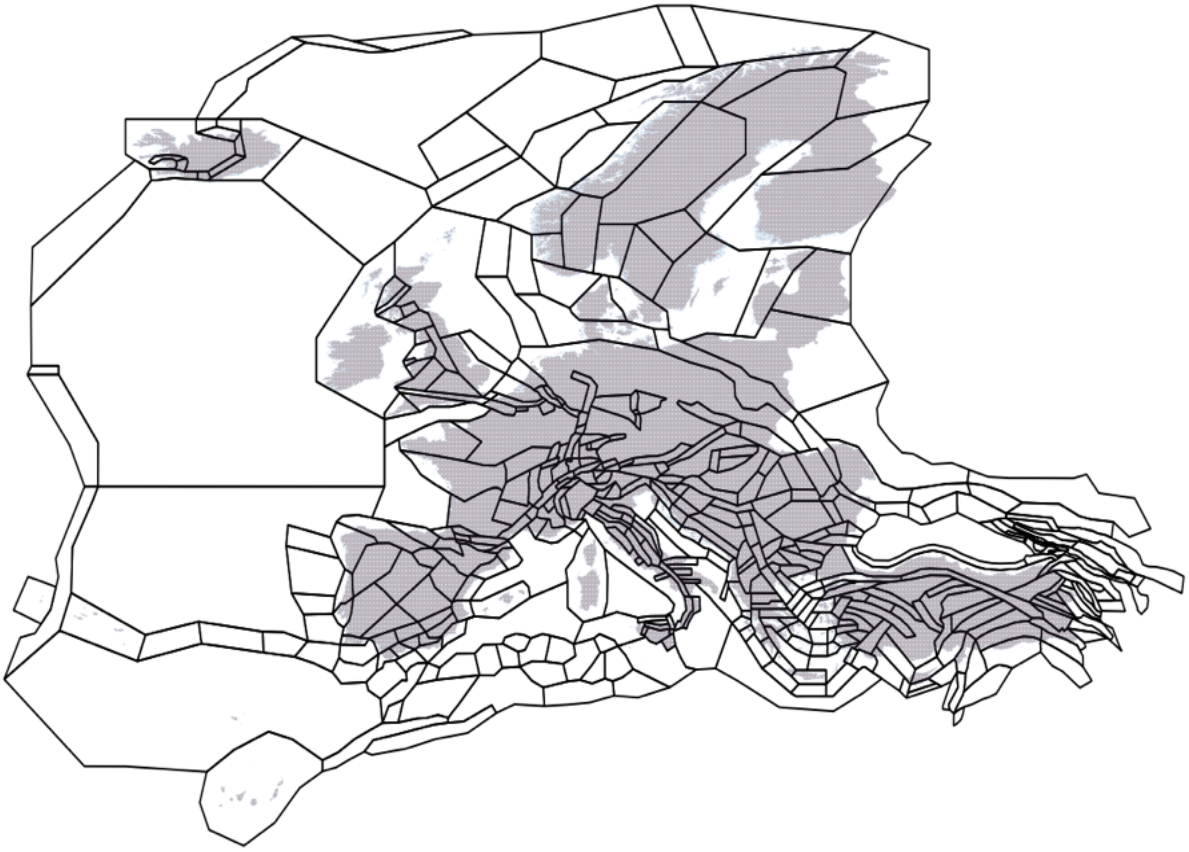

Figure 1: Updated area source model of Europe and Turkey comprising new seismogenic sources for, Belgium, Germany, Macedonia, Romania, Slovenia, Spain, Switzerland, Turkey; contribution for Northern Africa are taken from GEM's models whereas the Eastern Europe (Russia, Ukraine, Belorussia) was newly developed within the JRA3.

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