



Understanding site-specific PSHA results by hazard deaggregation into site intensities

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From 1998 till 2015 Swiss Nuclear Power Plants sponsored a set of comprehensive site-specific PSHA-studies (PEGASOS, PEGASOS Refinement Project) to define review level earthquakes as well as the input for their plant specific probabilistic risk assessments. The studies were performed following the US SSHAC procedures at their most elaborated level 4. Safety experts and risk analysts of Swiss Nuclear Power Plants recently have been mandated to implement the final results of the studies in their risk assessment studies. For an in depth understanding of the consequences of the hazard on practical decision making it is reasonable to compare the new studies with the original hazard assessment studies used for the development of the seismic design basis of the plants. These studies were performed in terms of intensity. For the comparison a hazard deaggregation methodology was developed that allows for the conversion of standard uniform hazard spectra (UHS) into site-intensity (factors) hazard curves. The method was applied for the nuclear power plant Goesgen using the PEGASOS hazard. The results were compared with the results of earlier hazard studies as well as with actual deterministic and probabilistic hazard studies performed independently from the PEGASOS study in terms of EMS-98 intensities. The comparison revealed that the results of the PEGASOS study led to site intensity factors comparable with the results of studies from the 1970-ies. The study may have under predicted the safety importance of historical large earthquakes like the Basel earthquake of 1356. Therefore, an important conclusion is that probabilistic hazard studies for critical infrastructures have to be accompanied by an independent physics-based study (modelling hazard assessment) that allows to perform a safety evaluation of historical earthquakes.

The paper presents the deaggregation methodology and the results of its application.