Natural Hazards
and Earth System
Sciences

Open Access

Discussions

NHESSD

Interactive
comment

Interactive comment on "New Approaches to Seismic Microzonation Modelling of Ground Shaking Using Direct Characteristics of Influencing Criteria: Case Study of Bam City, Iran" by Reza Hassanzadeh et al.

Anonymous Referee #1

Received and published: 5 October 2018

The paper presents the application a new methodology for seismic microzonation based on analytical hierarchy process and fuzzy logic methods. The procedure was applied to Bam city and the microzonation map was validated by comparing the output of study with experimental predominant frequencies and with the observed damage pattern. The results are encouraging, and the paper is well written however I have some relevant comments to be addressed by the authors. General comments. 1) The output is a qualitative ranking of the susceptibility of the area to ground motion amplification phenomena. The Authors should stress that is a kind of level-1 or grade-1

microzonation study according to international standards and guidelines. More detailed studies are needed in high-risk areas and should be based on numerical modelling of site effects (i.e, physically based procedures which cannot be replaced by influencing criteria methods). 2) my biggest doubts concern the criteria selected for the procedure. "consolidation and strength": consolidation should be replaced by stiffness (in terms of shear wave velocity or shear modulus) while the strength (i.e. soil resistance) is not pertinent; the resistance should influence the slope stability or the resistance to liquefaction not the amplification phenomena. The "particle size distribution" does not affect the amplification phenomena: the stiffness of soil is the controlling factor not the particle size: a coarse-size if loose soil can be softer than a consistent over consolidated fine grained clay ! The "depth of groundwater" is not pertinent for amplification effects, it only controls the possible occurrence of soil liquefaction in loose sandy soils. In table 1 is not clear the difference between morphology of bedrock and topography of bedrock (even if, as I understand, they are considered as minor criteria). I strongly suggest to remove these factors or better define them. Specific comments 1) It is not clear how the output of model is compared with experimental resonance frequencies. In terms of amplitude of HVSR peak with levels of shaking map ? Please describe better this validation phase. 2) Pag. 3: at the state of art, I don't believe that SSHA methods can be used for microzonation: source and path parameters are still quite significant to define. PSHA assessments at regional scale (at outcropping rock) and site response modelling at local (urban scale) are the most adopted procedure almost worldwide. Typing 3) Pag. 11: "microtremor" instead of "microtremore"