

## Response to reviewers' comments:

Dear referees,

We greatly appreciate your valuable comments on our manuscript and suggestion of very good papers. We have tried to address each of your comments in the revised manuscript base on reviewing suggested papers and scientific reasons, and hope the revised version of the manuscript will meet your expectation.

Our responses to your comments are listed below in italics following each specific comment.

Best regards,

Authors

### Referee 1

1- Please check references within the entire text, you often missed either a space or a semicolon to separate papers.

*\* References were revised and also double checked within the text and reference list.*

**2- Page 9:** (marine to Quaternary deposits) should be replaced by (marine to continental Quaternary deposits). Anyway, it seems to me that authors simply copied and pasted my previous comments, without clearly defining the nature of the sediment (do these sediments consist of alluvial plain gravels? Or alluvial fan gravels? Or sands? Or what else? Please clarify this point)

*\* This has been revised as seen below:*

*\* In the northern part of the city, the sediment (marine to continental Quaternary deposits including alluvial plain gravels with interlayered clay, silt and sand) thickness ranges from 0 m, where bedrock is exposed beneath Arg-e-Bam, to 90 m across most of the northern half of the study area.*

**3- Page 11:** “Geological Strength Index (Geological Survey of Iran (GSI))”. It is ambiguous if GSI refers to Geological Strength Index or to Geological Survey of Iran, cite them in the correct way.

*\* It has been revised as Geological Strength Index (GSI), and GSI only refers to Geological Strength Index.*

4- Aucelli et al. (2018) is listed in the text but it is missing in the reference list.

*\* It has been added to the reference list.*

*Aucelli, P. P. C., Di Paola, G., Valente, E., Amato, V., Bracone, V., Cesarano, M., Di Capua, G., Scorpio, V., Capalbo, A., and Pappone, G.: First assessment of the local seismic amplification susceptibility of the Isernia Province (Molise Region, Southern Italy) by the integration of geological and geomorphological studies related to the first level seismic microzonation project, Environmental earth sciences, 77, 118, 2018.*

5- Fah et al. (1997) is listed twice in the reference list.

*\* It has been revised.*

*\* Fäh, D., Rüttener, E., Noack, T., and Kruspan, P.: Microzonation of the city of Basel, Journal of Seismology, 1, 87-102, 10.1023/a:1009774423900, 1997.*

6- “Report on the Bam earthquake:

[http://www.ncc.org.ir/homepage.aspx?site=NCCPortal&tabid=1&lang=fa-](http://www.ncc.org.ir/homepage.aspx?site=NCCPortal&tabid=1&lang=fa-702)

702 IR, access: May 15, 2013, 2003.” is listed in the references but not in the text. In addition, I

checked the link and it does not contain a direct and immediate connection to this Report. So, I

suggest to remove from the reference list or, in alternative, to cite it correctly to provide a direct link to the Report.

*\* It has been replaced by another reference.*

*\* National Cartographic Center of Iran (NCCI): Report on the Bam earthquake, Tehran, 98, 2003*

7- Please check the reference list and list references in the correct form, according to NHEES guidelines (e.g., Fraume et al., 2014; Rehman et al., 2016; Teramo et al., 2005).

*\* All references were doubled checked and revised based on NHEES guidelines.*

## Referee 2

1- The paper can be published after some corrections.

2- Page 2: Expand the part related to seismic microzonation studies considering the following paper:

*\*The suggested references were reviewed and added in the text.*

MERM microzonation manual (2003) sets different criteria effecting the amplitude and duration of ground shaking at a specific site. These include “the magnitude of the earthquake, focal point and depth of the earthquake, directivity of the energy released, distance of rupture from the site, geological condition from the site to the location of the earthquake, local geological settings, **geotechnical properties**, and topographical condition of the site” (SM Working Group, 2015;Boore, 2003;Hassanzadeh et al., 2013;**Castelli et al., 2016a;Castelli et al., 2016b**).

In this research, Analytical Hierarchal Process (AHP) (Saaty, 1980) has been utilize as it is one of the most useful method in calculating criteria’s weights, and AHP in combination with GIS were applied to produce seismic microzonation map of Bangalore (Sitharam and Anbazhagan, 2008) (2008), Dehli (Mohanty et al., 2007), Haldia, Bengal Basin (India) (Mohanty and Walling, 2008), Erbaa (Turkey) (Akin et al., 2013) and Al-Madinah (Moustafa et al., 2016) **and generating ground-shaking map for Catania (Italy) using GIS (Castelli et al., 2016a).**

3- Page 2: In the list of earthquakes, insert also the one of L'Aquila considering the following paper:

*\*The suggested references were reviewed and added in the text.*

It has long been known that local conditions of foundation soils have a significant impact on the effects of an earthquake on building destruction level, as it was demonstrated in previous earthquakes such as Mexico City, 1985 (Beck and Hall, 1986), Kobe, 1995 (Wald, 1996), Izmit, 1999 (Tang, 2000), Umbria-Marche earthquake, 1997 (Moro et al., 2007) and Bam earthquake, 2003 (Ramazi and Jigheh, 2006) **and L'Aquila earthquake, 2009 (Monaco et al., 2012;Capilleri et al., 2014)** and buildings that were located on unconsolidated sediments had greater destruction levels (Ramazi and Jigheh, 2006).

4- Page 3: “behid” is perhaps “behind”.

*\* It has been revised.*

\* These are motivations **behind** conducting this research.

5- Page 9: “descried” is perhaps “described”.

*\* It has been revised.* To conduct this analysis, 10 experts were interviewed regarding membership degree of sub criteria of each criterion, and mode of each sub criteria was calculated and MFs for each criterion was depicted as **described** in the following:

6- Page 7 and 18: The reference “Aucelli et al., 2018” is absent in the References.

*\* I have added Aucelli et al. (2018) to the reference list.*

*Aucelli, P. P. C., Di Paola, G., Valente, E., Amato, V., Bracone, V., Cesarano, M., Di Capua, G., Scorpio, V., Capalbo, A., and Pappone, G.: First assessment of the local seismic amplification susceptibility of the Isernia Province (Molise Region, Southern Italy) by the integration of geological and geomorphological studies related to the first level seismic microzonation project, Environmental earth sciences, 77, 118, 2018.*

7- Page 11: Expand the part related to liquefaction considering the following paper:

*\*The suggested references were reviewed and added in the text.*

Research on the effects of groundwater shows it can magnify an earthquake’s damage. The most well known effect is liquefaction. The geologic and hydrologic factors that affect liquefaction susceptibility are the age and the type of sedimentary deposits, the looseness of cohesions and the depth to the groundwater table (Tinsley et al., 1985;Cavallaro et al., 2018).

8- Page 11: “Geological Survey of Iran (GSI)” is better “Geological Survey of Iran (GSI), 1993”.

*\* It is revised as Geological Strength Index (GSI), and GSI only refers to Geological Strength Index.*

9- Page 12: Expand the part related to 2d numerical analysis considering the following paper:

*\* The suggested references were reviewed and added in the text.*

\* The effects of slope angle on topographic amplification factor was investigated by Bisch et al. (2012), and they classified the slope angle into three categories with different effect level including: 0-15 with no effect, 15-30 degree with 1.2 (coefficient) and more than 30 degree with 1.4 amplification coefficient. *Although, Cavallaro et al. (2012) suggested that topographic amplification factor can be considerable for slope even less than 15 degree.*

\* In addition, several calibration constants should be calculated using 2d numerical analysis for each study area to compute topographic effects on local seismic amplification. *Cavallaro et al. (2008) investigated 2d model for analysing site response of the Monte Po Hill in the City of Catania considering the effect of topographic and stratigraphic properties on the amplification factor in an area. They concluded that near to the slop crest, the effect of topographic properties on amplification factor is more relevant than stratigraphic property.*

10- Page 14 and 17: The reference “National Cartographic Center (NCC), 2003” is absent in the References.

*\* It has been revised.*

*\* National Cartographic Center of Iran (NCCI): Report on the Bam earthquake, Tehran, 98, 2003*

11- The reference “Fath et al., 1997” is repeated twice.

*\* It has been revised.*

*\* Fäh, D., Rüttener, E., Noack, T., and Kruspan, P.: Microzonation of the city of Basel, Journal of Seismology, 1, 87-102, 10.1023/a:1009774423900, 1997.*