

## **General comments**

The manuscript titled "Liquefaction susceptibility assessment in fluvial plains using high-resolution airborne LiDAR data: the case of the 2012 Emilia earthquake sequence area (Italy)" by Civico et al. presents a novel approach for defining areas with high liquefaction susceptibility in fluvial plains using remote sensing, namely LiDAR. This manuscript presents a method for liquefaction susceptibility assessment in regions that are similar to the one of the Po plain in Italy. I recommend publication of this manuscript with some minor changes.

## **Specific comments**

- Page 4530 lines 2-5: "Differently, few studies applied a mainly geomorphological approach...". Please elaborate on the different approaches applied in previous studies.
- Page 4533 line 13-15: can the authors explain why do they think that only in 5 cases did liquefaction occur in both mainshocks in the Emilia sequence?
- Page 4536 line 18 and further on: the authors give percentage for the distribution of liquefaction phenomena among the different fluvial landforms. The percentages they give are unclear: are they percentage from the entire 1306 population, or from the population of the liquefaction occurrences that coincide with fluvial landforms? It seems that the latter is correct when stating that crevasse splays account for 20%, but the 63% of alluvial ridges and abandoned fluvial beds don't work either way. Please correct.
- The authors present a new method for generating liquefaction susceptibility maps, that is, areas that are more likely to experience liquefaction during an earthquake, and therefore require further investigation. In no way can this remote sensing analysis replace the geotechnical analysis, which estimates the liquefaction potential at a certain point, including factor-of-safety calculations. I therefore suggest being more modest when comparing the method to geotechnical methods. Furthermore, I feel that there is some confusion in the introduction section with regards to liquefaction susceptibility, hazard and potential maps, which are different products (page 4529, line 25 and on).

## Technical corrections

- Page 4528 lines 23-24: "soil liquefaction is one of the most outstanding hydrogeologic processes that can be originated during earthquakes...." - replace hydrogeologic with hydrogeological, and rephrase, for example replace "that can be originated" with "that can occur".
- Page 4530 line 16: "therefore, thanks also to a 1 m pixel..." - please rephrase – I would suggest "Thus, using a 1 m pixel..."
- Page 4531 line 13 – I think "canal" should be "canals".
- Page 4534 line 8: replace "not homogeneous" with "non-homogeneous".
- Page 4534 line 9-10: replace the current sentence with "...highlighted the need for a better understanding of the factors favoring liquefaction".
- Page 4535 lines 7-9: The sentence should be rephrased. Suggestion: "The residual DTM obtained... emphasizes the fluvial landforms.... and makes their comparison at different locations easier, independently of the regional trend".
- Page 4537 line 24: "...took advantage from the huge..." - replace **from** with **of**.
- Page 4538 line 7: the word frequency should be replaced with a different word, as frequency is density in time, and not in space. Perhaps "abundancy" will serve better.