



## Earthquake-induced soil liquefaction risk: macrozonation of the European territory taking into account exposure

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### Abstract

Among natural hazards, earthquakes claim a large number of casualties and economical losses each year around the globe. Excessive deformations of ground surface caused by earthquakes are of great concern in civil engineering, human lives and the environment. Such ground deformations are often associated with a phenomenon of soil instability called earthquake-induced soil liquefaction. Earthquake induced liquefaction disasters at a continental scale are currently addressed within the European research project LIQUEFACT. The University of Pavia (UNIPV) and the European Centre for Training and Research in Earthquake Engineering (EUCENTRE) are currently in charge for the definition of a European liquefaction risk map in the European territory (macrozonation). It is worth noting that liquefaction is a local phenomenon, thus the macrozonation of liquefaction risk at a continental scale is a challenge. This paper presents the preliminary deliverables of this activity, i.e. the maps for the European territory of liquefaction risk, computed by convolving soil susceptibility, expected seismic hazard and exposure.

**Keywords:** liquefaction; macrozonation; soil; risk; earthquake; Europe; GIS; exposure; geospatial.

### 1. Introduction

Susceptibility of soils to liquefaction is the tendency of certain geomaterials to undergo a severe stiffness degradation and loss of shear strength due to pore water pressure build-up caused by earthquake-induced ground shaking. Susceptibility to liquefaction typically involves saturated deposits of loose sands. Whether a soil

susceptible to liquefaction will actually exhibit this behaviour will depend on the severity of ground shaking (i.e. intensity of the expected seismic hazard).

Earthquake-induced soil liquefaction is a local phenomenon and several methods are available in the literature to assess at a specific site the susceptibility of a soil to liquefaction. Their