

# **Typological classification and damage scenarios of masonry churches after the 2016 Central Italy Earthquake**

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## **ABSTRACT**

The seismic protection of cultural heritage is an important topic that has been faced by several researchers in the last years. Seismic events of the past have highlighted the need to achieve an adequate knowledge of the vulnerability, in order to intervene on several types of existing masonry buildings, in particular on churches, in order to put in the field proper mitigation measures at the large scale.

According to this premise, this paper deals with the damage scenario observed on eighty seven churches hit by the 2016 Central Italy earthquake. In a first stage, the most important structural characteristics of the studied churches are discussed and threatened by the statistical standpoint. The reported information have been collected through the A-DC form, adopted by the Civil Protection Department and by the Ministry of Heritage and Cultural Activity and Tourism (MiBACT), which was used in the framing of the damage reconnaissance activity carried out by the ReLUIIS Italian consortium in the aftermath of the earthquake.

Also, the form has been used in order assess the damage of each macro-element and, then, to assign a vulnerability index to each church. Once that the vulnerability index has been put in relation with a proper limit state, the scenario has been represented by means of Damage Probability Matrices.

The presented work is framed in a wider research activity that aims at providing a predictive methodology for the vulnerability assessment of churches at the regional scale. This methodology was already calibrated on the basis of the 2009 L’Aquila seismic event. The outcomes presented in this paper will serve to further prove the reliability of the proposed model.