Monumental Inca remains and past seismic disasters: A relational database to support archaeoseismological investigations and cultural heritage preservation in the Andes

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ABSTRACT

As recent dramatic and numerous examples demonstrate, earthquakes still constitute a significant threat to cultural heritage (Bam 2003; L’Aquila 2009; Haiti 2010; Nepal 2015). By damaging the historical legacy, telluric phenomena affect economic and touristic incomes and alter regional identities and collective psyche. In the Andes, as in other emerging regions across the globe, deficient seismic hazard assessments, constant lack of resources, and inadequate maintenance programs are additional challenges for cultural heritage management. As part of our archaeoseismological investigation in the Cusco area (Peru), we developed a relational database, which seeks to identify, record and inventory seismic damage in pre-Columbian architecture. This work presents the main characteristics of the structure and design of the RISC (“Risque sismique, Incas et Sociétés à Cusco”) database and its contribution in supporting the fieldwork organization and facilitating the data acquisition. The collected architectonical evidence constitutes the first large archaeoseismological dataset in South America and will provide valuable complementary data in Peru to regional seismic hazard studies. We here aim to demonstrate that an ergonomic and user-friendly interface has a role to play in supervising and preserving the cultural heritage in active seismic areas. By converting ad-hoc surveys into routine inspections, RISC could become an effective low-tech monitoring system, providing relevant support for disaster risk reduction plans in archaeological sites conservation. We stress the necessity of adopting cost-effective and easy-to-implement tools for cultural heritage monitoring in emerging countries through this case study. Our database may represent a relevant methodological background and template for further initiatives in both fields of archaeoseismology and cultural heritage protection.

1. Introduction

As a social, cultural and symbolic act, architecture and, more specifically, the built heritage is an integral part of the collective memories and traditions (Caimi, 2014; Garnier et al., 2013; Ortega et al., 2017). In 1972, during the General Conference of the UNESCO, State parties agreed on the necessity of “ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage” (UNESCO, 1972, Art.4). To do so, the international organization proposed several guidelines related to seismic hazard mitigation (UNESCO, 2007, p. 173): “reducing risk through ensuring maintenance,” “strengthening buildings,” “improving earthquake warning systems” as well as “developing comprehensive earthquake plans.” The creation and development of monitoring systems

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