

Historical and typological characterization of churches in the Centre of Cusco, Peru

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ABSTRACT

The Spaniards, during the conquest in Peru, starting in the sixteenth century built their churches on the remains of older Inca buildings. This vertical layout is still visible today in several examples. On the other hand, the city of Cusco lies in an active tectonic area with several intraplate faults. The 1650 and 1950 earthquakes had devastating consequences on churches: bell towers were destroyed, roof structures collapsed and walls cracked and overturned. Reinforcements and structural changes were introduced to strengthen the churches. As a result of damage caused by past earthquakes, reconstruction and retrofitting interventions and structural enlargements the historic center of Cusco hosts today several churches made of complex structures that represent a challenge for the analysis of their static and dynamic behavior.

Due to their architectural and artistic beauties, including sculptures and paintings of great historical and economic value, the churches of Cusco are visited daily by thousands of tourists. They are also worship buildings central to the religious and cultural beliefs of the people of Cusco. It is thus fundamental to establish management measures that help preserve these structures and safeguard the safety of the people visiting them and protect the artistic, architectural and cultural treasures they host.

This article presents an exhaustive description of the architectural and structural typologies of the churches of the historic center of Cusco, with the purpose of establishing their safety and highlight the most common vulnerabilities with the associated failure mechanisms that can be triggered by earthquakes of different magnitude. In order to understand the structural behavior of any historical building, and more specifically of these churches, it is necessary to reconstruct the history, geometry, materials and interventions experienced by these churches over the centuries. Until now, twelve churches have been identified as part of the historic center, and the predominant building material for walls is stone layed with mud mortar and adobe.

The results of this research contribute to the knowledge of the seismic vulnerability of churches in Cusco and give conclusions to be used by decision makers for further resilience plans.