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Title: The CLAYONRISK project: bricks manufacturing technologies to increase the built heritage resilience and to raise the common identities of peoples

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Abstract

The Built Heritage is increasingly at risk mainly due to environmental changes and natural hazards. As traditional material, building bricks represent an eco-innovative solution for restoration purposes meaningfully linked with cultural identity of peoples. Framed on current ceramic industry challenges and risk assessment of cultural heritage strategies, CLAYONRISK aims to underline the technological and heritage value of building ceramics. The project entails an interdisciplinary approach to set up the influence of the manufacturing processes on bricks -ancient and new produced- to strength the resilience of ancient structures, bringing together green-solutions and common cultural values. In CLAYONRISK, the multidisciplinary study of building bricks is launched as Disaster Risk Reduction (DRR) preventive measure, as bricks resistance over time is tackled from the manufacturing process. Moreover, the multisectorial cooperation is also addressed, as the interaction between academic and industrial research is explored.

The multianalytical study pursuit by CLAYONRISK is mainly based on archaeometric methodologies, where color measurements by means of Fibre Optics Reflectance Spectroscopy (FORS) and compositional/textural analysis through X-ray fluorescence (XRF), powder X-ray diffraction (PXRD), polarized optical microscopy (POM), field emission scanning electron with EDS microanalysis microscopy (FESEM-EDS), Nuclear Magnetic Resonance (RMN) or Raman Mössbauer spectroscopies are performed. Likewise, bricks resistance over time is assessed by artificial ageing tests (ASTM D 5313, EN 14066:2013, EN 12371:2010) and physical (hydric and mechanical) parameters determination, such porosity and pore size distribution by means of Mercury Intrusion Porosimetry (MIP), the total (ΔM) and relative (Δm) anisotropies (EN 1926:2007) or the pull strength (EN 12390-6:2001) and flexural strength (EN 12372:2007).

The results achieved by CLAYONRISK, carried out under a MSCA European Fellowship, will open a new line of research, where the assessment of manufacturing parameters - mainly clay composition and firing temperatures- on bricks physical behavior, the environmental improvements and energy saving at current brick production and the cultural values of peoples are jointly addressed.