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Mapping Lioz limestone in monuments at Rio de Janeiro, Brazil

Amanda Mozer¹, Nuria Castro², Kátia Mansur³, and Roberto Carlos Ribeiro⁴

¹Geosciences Institute, Federal University of Rio de Janeiro, Rio de Janeiro-RJ, Brazil (amandam@ufrj.br)

²Centre for Mineral Technology - CETEM/MCTIC, Natural Stones, Rio de Janeiro - RJ, Brazil (ncastro@cetem.gov.br)

³Geosciences Institute, Federal University of Rio de Janeiro, Rio de Janeiro-RJ, Brazil (katia@geologia.ufrj.br)

⁴Centre for Mineral Technology - CETEM/MCTIC, Rio de Janeiro - RJ, Brazil (rcarlos@cetem.gov.br)

Lioz limestone is a well-known Portuguese natural stone, recognised as Global Heritage Stone Resource (GHSR) by the International Union of Geological Sciences (IUGS). This microcrystalline Cretaceous limestone was broadly used in churches and monuments, especially in Lisbon, where it is exploited. It exhibits four varieties of colours: ivory (Lioz), beige (Chainnette), dark pink (Encarnadão), yellow (Amarelo de Negrais), and also many fossils of Rudists, Gastropods and *Thalassinoides*. This rock was brought to Brazil as ballast in vessels, to stabilise them, and to bring a Portuguese symbol to the "new land". It was mostly used in historical buildings in coastal cities (Belém, Recife, Salvador, São Luis, and Rio de Janeiro) from the 16th to the 20th century, though it can be found in many other of Brazil. The stone that shines in Lisbon, the Royal Stone from Portugal, keeps in Brazilian monuments the memory of the strong relationship between Portugal and Brazil, along this country's history, first as an overseas colony and later as the seat of the United Reign of Brazil, Portugal and the Algarves. The history engraved in these monuments guards that memory, being essential to study the processes of degradation that these rocks suffer. In the central region of Rio de Janeiro, known as "Old Rio", many heritage buildings present Lioz limestone, usually together with local gneisses, in their construction and ornamentation: in floors, altars in churches, walls, columns and others. Some examples are the Royal Portuguese Cabinet of Reading, the Church of Our Lady of the Candelaria, the Bank of Brazil Cultural Center, the Imperial Palace, the Saint Francis of Paola Church, the Saint Luzia Church, the Master Valentim Fountain, the Holy Cross of the Military Church, the Saint Joseph Church, the Riachuelo Teather, and the Gustavo Capanema Palace. The last one is a symbol of the modernism in Brazil. Some of these buildings are in routes of urban geotourism as a form to disseminate science. These places are relevant in many aspects, such as cultural, historical, architectural, geological and educational. Rio de Janeiro is a coastal city with an average temperature of 23,2°C, rainfall of 1,278mm per year and relative humidity of 78%. Lioz limestone's alteration gets more accentuated in these conditions, and the deterioration can be even more intense. Another point to observe is that many of these buildings are in high traffic areas, and the pollution emitted by the vehicles is highly prejudicial because of the cycles of dry and wet deposition. The Lioz limestone presents low porosity; however, problems as black crusts and biological colonisation are common and can lead to severe forms of degradation, and the monuments' mischaracterisation. This work aims to elaborate an inventory of the monuments constructed and ornamented with Lioz limestone and the observed

decay patterns of this stone in Rio de Janeiro. The inventory and the study of the mechanisms and extension of their degradation over time are crucial for their effective conservation for future generations.