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Gneisses of Brazil's cultural heritage buildings and its most frequent degradations

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Macroscopic descriptions of cultural heritage buildings constructed using gneisses in the cities of Rio de Janeiro, Belo Horizonte and Ouro Preto, Brazil, allowed to identify alterations and degradations, in part conditioned by the mineralogical composition and the structures present in these stone materials. It is important to emphasize that: - some changes still begin in the environments where these materials were formed, experiencing an intensification from the processes of extraction, processing and application; - modifications occurring after the applications are understood herein as degradations. The studied gneisses present banding consisting of parts with different thicknesses and mineralogical contents. Due to these differentiated contents, clear bands were identified and constituted essentially by felsic minerals, such as feldspars and quartz, as well as dark bands formed by mafic minerals represented by: biotite, garnets, amphiboles, such as hornblende or pyroxene (hyperstene). In addition to these minerals, low contents of oxides and sulphides were found. Also under the influence of this distribution of minerals, planar structures or foliations, more or less developed, that can be very penetrative have been identified, mainly when these rocks were submitted to the performance of milonitization processes. From the set of changes and degradations observed stand out those related to the decomposition of minerals that make up these materials. In these cases, feldspars and other silicates, such as micas, amphiboles and pyroxenes, were decomposed due to the hydrolysis and products were generated which compromised the resistance of these stone materials, leading to their consequent disintegration. On the other hand, the presence of expansive clays in these products, caused volume increases which also contributed to the expansion of the weathered surface layer (blistering). This process may result detachments in the form of scales to cavities in cases of significant loss of components. Still related to minerals of these rocks, degradations occurred due to the oxidation of the iron present in these rocks in the silicates and oxides. This process, which was more intense in hot, tropical regions, was responsible for chromatic alterations with predominance of reddish color. When the action of this process occurs in conjunction with hydration, it becomes much more effective and manifests itself in much more extensive areas. In these cases, minerals containing iron, for example, have changed to hematite or limonite, causing important chromatic variations identified by the appearance of a yellow-brown coloration in the studied materials. In relation to the structural arrangements, the influence of these in the degradation processes was verified. Here we highlight the exfoliations and detachments parallel to the structures of these materials. Other detachments observed result from the formation of black crusts that end up leading to the appearance of bubbles or spells that eventually evolve into the detachments. Contrary to what is observed for others rocks with feldspar quartz composition, but with hypidiomorphic granular texture, rounding is not frequent.