Geophysical Research Abstracts, Vol. 7, 00702, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00702

Stone decay in historical buildings: The case of Lisbon's Cathedral (Portugal)

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Lisbon's Cathedral is one of the most rich and unknown Portuguese monuments built after 1147. Its present form is due to the various campaigns of building and rebuilding works along History. The Cathedral is an emblematic building not only due to its historical values but also to the variety of stone materials used and decay forms that it presents.

In this paper the methodological approach used to study stone decay phenomena at Lisbon's Cathedral is presented. Aspects like characterisation of main stone materials used in this monument (chemical, mineralogical, petrophysical and geomechanical characterisation) and main stone decay forms are presented (to evaluate some of the diagnosticated pathologies techniques such as infrared absorption spectroscopy, x-ray diffraction and fluorescence spectrometry, optical microscopy, Mössbauer spectroscopy, ultrasound indirect method, spectrocolorimetry and endoscopy were used).

Among the decay factors that are involved in the deterioration phenomenona of monumental stones, are involved not only their intrinsic characteristics but also some extrinsic characteristics related to the environment. The quantification of some of the parameters that characterize the environment around the Cathedral (gaseous air pollutants, atmospheric aerosol, thermal and hygrometric parameters and rain waters) is also made. These parameters are co-responsible for some of the observed pathologies.