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Compatibility assessment in the replacement of the damaged sandstone used in monuments of the Ebro Valley. Applied case to problems arising from long term water/rock interaction

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In order to manage the problems arising from the water/rock interaction in the Miocene sandstones (calcareous litharenites) widely used in various monuments of the Ebro Valley (NE of Spain), an experimental survey has been carried out with particular application to the building and architectural decorative materials of the Cathedral of Huesca. Once the current state of decay was diagnosed and the processes of alteration (enhanced by certain intrinsic factors and their particular exposure to the environment) were detected, an experimental essay was designed. On the one hand, it has been tested with various water-repellent products, both in the monument itself and in the laboratory, to see its effectiveness and long-term efficacy. On the other hand, in order to replace certain weathered parts, the performed study evaluates the compatibility with other available sandstones in the market. Their hydric characteristics and behavior against accelerated ageing cycles have been valued using the same water-repellent treatments. From the obtained experimental results practical and remedial works have been proposed to minimize the damage evolution.