



Study by X-ray CT of the influence of the textural anisotropies on the movement of fluids inside sedimentary rocks used in the Monumental Heritage of Asturias (NW of Spain)

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The X-ray computed tomography (CT) technique has been applied to the study of the influence of some textural anisotropies (bedding, Liesegang rings, compositional layering, burrows and graded bedding) on the movement of fluids inside a sedimentary rock, the Marina Sandstone, that has been used as dimension stones in some historical monuments of Asturias (NW of Spain). The specimens, 50 mm cubes, were imaged under a fourth generation X-ray medical equipment using a working conditions of 120 kV, 100 mA and 310 μm of spatial resolution. The CT images of capillarity and water free absorption tests have allowed to establish the influence of some textural and mineralogical characteristics on the movement rate of the water. The role of the porosity is the most important one although the presence of iron oxides also influences the water movement. The images of the absorption of water repellent and consolidant product applied by capillarity method into the specimens show good contrast; the study of the Hounsfield numbers have allowed to estimate both the rate and the penetration depth of these products. The effectiveness of the treatment has been evaluated by X-ray CT studies of capillarity and water free absorption tests on treated samples resulting in an improvement of the rock characteristics. This fact has also been assessed by comparison of ultrasonic wave velocities in pre and post treated specimens.