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Evolution of the alteration process in time of granitic materials from Valdemorillo quarries used in built heritage, Madrid, Spain

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Alteration of building materials used for heritage construction already starts in the quarries, where materials are subjected to both natural alteration and anthropic decay, this latter caused by the rock extracting, cutting and carving processes. Once the materials are placed in the building, they are exposed to other agents that accelerate their decay, especially if they are exposed to aggressive environments. Materials petrophysical properties tend to vary according to the alteration degree they have experienced, the longer they have been exposed to decay agents, the greater the properties change.
Surface hardness of granitic rocks tend to diminish when they deteriorate, increasing its porosity, which usually is reflected on a decrease of the ultrasound propagation velocity measurements.
Ultrasound velocity and surface hardness were measured in 200 monzogranite ashlars use to build the Assumption of Our Lady church (Valdemorillo, Madrid, Spain). Ultrasound velocity was measured using the indirect transmission mode, with 54 kHz frequency transductors, and surface hardness by means of the Schmidt hammer rebound tester.
This monument was erected in different building stages. The starting point was a Mozarab or Visigoth defensive tower (8th century). Templars readapt it to a castle-convent (12th and 14th centuries), the tower being converted into a higher bell-tower. During the 14th-15th centuries the Cistercian Order made significant modifications of the complex, being the construction of the Chapter House one of the last enlargements during the 17th century.
The quarries located in the surroundings of the monument were used for the first building stages. In the recent fronts of these quarries that have been used along the 20th century, ultrasound and hardness measurements were performed to obtain the values of these parameters in unaltered materials to compare them to those measured in ashlars from different constructive periods. A total of 50 recent front quarries were measured.
Results show that quarry granites ultrasound velocity is much higher than those measured in the granite building. The older the monument ashlars, the lower the US velocity values: from data of 2 515$\pm$630 ms-1 in quarry materials we measured velocities of 1 880$\pm$720 ms-1 in 17th ashlars, 1 415 $\pm$335 ms-1 in 12th-13th ashlars and 1 040$\pm$170 ms-1 for the oldest granites (8th century). At the same time, for sclerommetric index, values decrease from 30$\pm$10 in quarries to 22$\pm$4 in the 8th century ashlars, 24 $\pm$4 (12th-13th centuries) and 26 $\pm$ 5 for the granites placed back in the 17th century.