



## **The role of the microfissuration of the rock matrix in the abrasion resistance of ornamental granitic rocks**

Angel Rodríguez-Rey (1), Nuria Sanchez-Delgado (2), Clara Camino (1), Lope Calleja (1), Vicente G. Ruiz de Argandoña (1), and Alexia Setien (1)

(1) University of Oviedo, Dpt. Geology, Oviedo, Spain (arrey@geol.uniovi.es), (2) Fundacion Centro Tecnológico do Granito de Galicia, O Porriño, Pontevedra, Spain

The microcrack density and the abrasion resistance of five ornamental granites (Albero, Gris Alba, Mondariz, Rosa Porriño and Traspieles) from Galicia (NW Spain) have been quantified as part of a research aimed to interpret the cuttability of the rocks in relation to the petrophysical properties of the rock matrix. Large blocks from the quarries have been cut with an industrial saw and the microcrack density and the abrasion resistance have been measured in two surfaces: H, parallel to the cut surface; T, perpendicular both to the cut surface and the cutting direction. Both planes are perpendicular to the rift plane, as it is known in quarry works.

The microcrack density has been quantified following an stereological procedure applied to polished sections imaged under scanning electron microscopy. The magnification of the images allowed the study of microcracks as narrow as 2 microns in aperture. The density has been quantified in terms of length of microcrack traces per surface unit so possible anisotropies of the microcrack network could be detected. The obtained values are in the typical range for this type of rocks although the Traspieles granite shows a higher value due to its weathering degree (H: 5.11, T: 5.37 mm/mm<sup>2</sup>). The values measured in the two surfaces (H and T) are quite similar in four of the rocks; only the Albero granite shows a marked anisotropy (H: 2.76 T: 3.53 mm/mm<sup>2</sup>).

The abrasion resistance of the rocks has been measured following the european standard EN 14157:2004 using the capon method. The rocks can be classified in two groups according to their abrasion resistance. Rosa Porriño, Gris Alba and Mondariz granites are the more resistant to abrasion with values around 16-17 mm. Albero and Traspieles granites are less resistant with values higher than 19 mm.

The results show a good correlation between the microcrack density and the abrasion resistance. As can be expected the rocks with high microcrack density show low abrasion resistance. The coefficient of determination, R<sup>2</sup>, obtained with the values of the H surface is 0.67 and the coefficient corresponding to the T surface is higher, 0.81.

### **Acknowledgements**

This research has been funded by the "Dirección General de Investigación Científica y Técnica del Ministerio de Economía y Competitividad" (Spain). (Project MINECO-13-CGL2012-33588)