



Destructuration of typical Sicilian calcarenites

Margherita Zimbardo (1), Anna Scotto di Santolo (1), Massimo Ramondini (1), Nicola Nocilla (2), and Aldo Evangelista (1)

(1) University of Naples Federico II, Hydraulic, Geotechnical and Environmental Engineering, Naples, Italy (anscotto@unina.it), (2) University of Palermo, Palermo, Italy (nicola.nocilla@unipa.it)

This paper presents results of experiments carried out on two different lithotypes of Sicilian fine grained calcarenite: Marsala and Palermo calcarenite. The 'calcarenite di Marsala' was extracted in two open pit mines located at Mazara del Vallo and the 'calcarenite di Palermo' extracted from the subsoil of the historical center of Palermo (Italy). In calcarenites, as well as in all sedimentary rocks, the stiffness and strength does not depend only on the friction and on dilatancy, but also on the "structure" (Leroueil and Vaughan, 1990). The structure is regarded as the combined effect of diagenetic fabric, size sorting packing shape and orientation, and bonding (Mitchell, 1976). The experimental programme has been carried out on intact specimens in order to investigate the mechanical behaviour of the natural material. The mechanical characterization was carried out by means of uniaxial, triaxial, oedometer and isotropic compression tests. The strength and the deformability of the calcarenite are highly influenced by the structure (fabric and bonding) and by the destructuration processes. A better understanding of fracture development behavior is gained through a combination of Acoustic Emission and photographic monitoring, on non homogeneous samples with natural pre-existing heterogeneities, due to cementation or to density, evaluated by computerized tomography technique (CT). The results show that, the destructuration, the fracture propagation and also the strength are highly dependent on the position and the distribution of the heterogeneity in the sample.