Geophysical Research Abstracts
Vol. 19, EGU2017-3982, 2017
EGU General Assembly 2017

Quarry waste management and recovery: first results connected to Carrara marble ravaneti (Italy)

Giovanna Antonella Dino (1), Claudia Chiappino (2), and Piergiorgio Rossetti (1)

(1) University of Torino, Departmento of Earth Sciences, Torino, Italy (giovanna.dino@unito.it), (2) SET - Società di Engineering del Territorio Srl - Turin – Italy

Quarry waste (QW) represents a huge economic and environmental issue, due to loss of resources and to economic and environmental costs connected to waste management and landfilling activities. In many cases, valuable Raw Materials (RM) and Secondary Raw Materials (SRM) can be supplied by enhancing the QW recovery.
In Italy large amounts of QW have been and still are dumped: such materials, if their quality (chemical, mineralogical, physical characteristics) and quantity are adequate, and if the impacts connected to their management are positive, can represent a valuable resource for SRM exploitation.
Several dimension stone quarries have been and are interested by researches as for QW exploitation. Some researches show positive results, which are the basis for QW recovery (both from waste streams and from quarry dumps exploitation): a noticeable example is represented by Carrara marble waste.
The Carrara quarry basin is characterized by ca. one hundred quarries for colored and white marble exploitation. The waste production can be summarized in: 80 Mm3 waste present in old quarry dumps (Ravaneti) and 3 Mm3/y of waste stream from quarrying activities. At present only 0.5 Mm3/y of QW is exploited for SRM production, causing a huge loss of resource. This has been the background for a preliminary research, on Carrara marble Ravaneti characterization, which was carried out thanks to the close cooperation between University of Torino, Società Apuana Marmi srl, and SET srl.
In 2015, two QW dumping areas, Calocara and Lorano, were selected as representative for sampling activities. Three main sample categories were individuated based on granulometry (0.5-4 mm, 0-25 mm, 0-150 mm) to be characterized (size distribution, density, Atterberg limits, Los Angeles test, freezing and heat tests, flat and shape indexes, geochemistry, mineralogy). The results obtained are promising: the physical characterization shows an attitude for Carrara QW to be recovered as crushed materials for embankments and armour stone. Furthermore, the mineralogical and geochemical analyses show that these materials, being composed of nearly pure $CaCO_3$, could find a proper application in high value products, as filler for paper, rubber, paint, plastic, etc. These data need to be confirmed by other analyses, thus a systematic characterization of QW present in the different quarry dumps is going to be programmed.
R&D is strategic to solve problems connected to QW and landscape management. The cooperation between private Companies, Research Centers and Local Authorities is fundamental to reach the target, in terms of experimentation of new products (for civil works and infrastructure, building industry, agronomy, high-tech, etc.). Furthermore, if the stone industry aims at guaranteeing the systematic and convenient SRM recovery from QW, a change in exploitation and working activities has to be planned (eg. selection of the potential SRMs; dedicated stock areas for selected SRM; proper treatments depending on the kinds of reuse; treatment-activity protocols to produce each new product, etc.).