Petrochemical characterisation of natural stones from the Etruscan site of Marzabotto (Bologna-Italy): Preliminary results

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The tufa rocks used in sacral buildings in the Etruscan site of Marzabotto (Bologna, Italy) were characterised from a petrochemical point of view and compared with lithologies outcropping in the surrounding area in order to recognise the ancient quarries. These tufa, called "travertini" in the Italian literature, are very porous and are rich of macrophyte moulds revealing an origin by freshwater carbonate deposition (Ford-Pedley, 1996) Facies and thin section analyses show that these rocks were formed in cascade and paludal settings. Hypothesising that the possible quarry areas of travertine rocks were not far from the site and using the geological maps of the surrounding of the Etruscan site it was possible to identify few possible supply zones: 1) San Cristoforo di Labante (Castel D'Aiano, Bologna), 2) Rio Sponga (Marzabotto, Bologna) and 3) Rio Bucamante (Serramazzoni, Modena). Petrochemical characterisation were complemented with a statistical elaboration using the SPSS 14.0 (Copyright © 2006 SPSS Inc.) method and have highlighted that the San Cristoforo di Labante deposit could be the most suitable quarry area of the travertine used in Marzabotto.

The geomorphology of the area suggests that blocks were lowered from the San Cristoforo di Labante deposit through a "lizza" way (using rollers along a prepared slope) and then shipped along the Reno River to the Etruscan site of Marzabotto.

References

T. D. Ford, H. M. Pedley, (1996) A review of tufa and travertine deposits of the world, in: *Earth-Science Reviews*, **41**.

Change of iron redox state during terrestrial impact melts (glasses) formation

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Glasses of tektites and impact bombs are characterized by very low $Fe^{3+}/\Sigma Fe$ ratios in comparison with their source matter - Earth's crust rocks. It is supposed that the main reason of reduced state of iron in impact melts (glasses) are redox reactions with the assistance of iron ions that exist during decompression of terrestrial matter exposed to powerful impact effect (Kadik et.al., 2003; Lukanin and Kadik, 2007).

It is shown that redox reactions inevitably have to occur in oxide melts of Fe-O and SiO_2-FeO-Fe_2O_3 systems, containing various ions of iron, in consequence of incongruent evaporation of melts during pressure decrease under high temperature conditions. Reduction or oxidation of iron takes place during decompression evaporation of melt under both closed and open conditions depending on its initial oxidation degree. $Fe^{3+}/\Sigma Fe$ ratio in this process aspire to some extremely low value.

This property of Fe-bearing systems is important for understanding the redox state of melts forming in impact processes as a result of melting and evaporation of crust matter. Adibatical decompression of high temperature impactitic melts should be accompanied by their reduction (Fe^{3+}/Fe^{2+} decrease) in comparison with relatively oxidized initial matter of the target. The main condition for reducing reactions to proceed is full melting and partial evaporation of matter, involved in the impact process, and the attainment of very high temperatures (>1800-2000ºC) that are characteristic for impact bombs and tektites formation at certain stage of unloading. The higher is the temperature the stronger is the effect of decompression reduction. Extremely low $Fe^{3+}/\Sigma Fe$ ratios in tektites ($\leq$ 0.1) are apparently the result of decompression reduction of the most high temperature impact melts.

References

Kadik A.A., Lukanin O.A., Zharkova E.V., and Fel'dman V.L., (2003), *Geochemistry International* **41,** 865-880.

Lukanin O.A. and Kadik A.A., (2007), *Geochemistry International* **45,** No. 9 (In press.).