

## Soapstones from the Ossola Valley (Piedmont, northern Italy)

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The term “soapstones” is referred to “soft”, easily workable stones (talc and/or chlorite-rich metamorphic rocks, deriving from mafic – ultramafic protoliths), typically used for jars, pots and pipes. The term has been also improperly extended to “harder” varieties (e.g. serpentinites), mostly suitable for roof slabs and millstones. These rocks are characterized by easy workability and fire-resistance, and they had a remarkable historical, artistic and archaeological importance. In the Ossola region (Piedmont, northern Italy), the soapstones are traditionally known as “Pietra Laugera”, “Pietra Lavizzaria” or “Pietra Ollare”, and represent one of the oldest stony raw materials used since the Bronze Age (archaeological find in the Toceno surroundings, Vigizzo Valley). The discovery of archaeological handmade objects in the surroundings of the Ossola Valley testifies a massive use of green stones during the I century A.D., even for cinerary urns and grave outfits. A lot of two handles pots and milk vessels date back to the Middle Ages, as well as millstones and water pipes. Artistic and ornamental uses are documented in churches and civil buildings: for example, columns, capitals, pilasters and bas-reliefs (Sacro Monte del Calvario chapels, now UNESCO heritage, and the Collegiale Church in Domodossola) as well as fireplaces (e.g. Silva Palace in Domodossola), sculptures, ornaments and balustrades. The productivity reached the top in the XIX century and stopped in the twenties; nowadays the extraction occurs only in the Loana Valley, with a very limited production. The historical soapstones derive both from ophiolitic complexes (Antrona and Zermatt-Saas Zones) and from the ultramafic complexes within the Orselina-Moncucco-Isorno Zone, Monte Leone nappe and Sesia-Lanzo Zone. The historical quarries are usually small (even erratic boulders), and scattered over many lateral valleys, such as Brevettola, Antrona, Bognanco and Loana. A total of 52 representative samples were selected from all the abandoned quarries and analyzed, in order to highlight differences and relations among mineralogy and microstructures (PLOM, quantitative XRPD, SEM-EDS, WDS), whole-rock geochemistry (ICP-AES and ICP-MS) and porosity (Hg-intrusion porosimetry - MIP). The mineralogical and petrographic investigations evidenced a marked mineralogical and textural heterogeneity, ranging from talc-olivine-chlorite felses, talc-amphibole-carbonate felses, serpentinitized peridotites up to talc-bearing serpentinites. The microstructures range from massive, coarse grained talc-bearing peridotites, to mylonitic serpentinites with non-pseudomorphic textures. From a geochemical point of view, there is a marked variability in major and trace-elements, due to the lithological heterogeneity and the variable serpentinitization and carbonation degree. The total porosity values (MIP) range between 0.07% (Bognanco mylonitic serpentinite) and 1.06% (Moncucco talc-amphibole-carbonate fels). This research represents a first attempt of archaeometric study for the soapstones from the Ossola Valley: it evidences the usefulness of a combined mineralogical, petrographical and geochemical approach in order to identify the exploitation and provenance sites.