slopes, eventually evolving in subvertical escarpments. Both terraces and escarpments are depositional rather then erosional features, being geomorphic expression of very shallow lacustrine deposits and waterfall structures respectively, and do not correlate with lowering of base level.
Several studies on chemistry of travertine depositing systems suggest that parent waters in the process of restoration of carbonate equilibrium with atmospheric CO2 display chemical gradients along their flow. As suggested by sedimentologic data, carbonate availability has a main control on morphology of travertine deposits, modulating shape and downhill development of the resulting carbonate accumulation.
Travertine likely start to deposit in braided fan-like fluviatile setting developing downhill carbonate springs, the bulk of accumulation occurring along sector of grater slope. Upward growth gradually decreases original slope angles throughout the formation of suspended channel systems, so that the water flow is laterally displaced toward adjacent areas of steeper slope, accounting for juxtaposition of travertine mounds. By means of continuous lateral shifting of encrustation process travertine deposition gradually transform original slopes in gently inclined flat areas limited downhill by steeper slopes. This in turn results in a new sedimentary environments, including ponds and shallow lakes in the flattened areas, and waterfalls along the steeper and steeper downhill edge of the travertine prisms.

T52-18 Poster Alberto, Walter

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THE "PSEUDOCARNIOLE": A MARKER FOR PRE-QUATERNARY ALPINE GEOMORPHOLOGICAL EVOLUTION-

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Key terms: karst; carbonate rocks; Pliocene; Quaternary; Western Alps

In the Alpine geological literature some particular carbonate rocks having a vuggy appearance, associated with evaporite rocks, have a controversial origin and diversified, uneven, nomenclature. An excellent exposure along the Susa Valley (Italian Western Alps) permitted a relatively full analysis of a group of such vuggy rocks in situ. Five main lithologies have been identified with respect to their nature, shape, dimensions and organization of the clasts, also according to the matrix and the composition of the cements.
These rocks have been described, from both lithological and structural points of view, in comparison with other similar Alpine rocks (Rauhwacken, carniole, cornieules, cargneules) and Apenninic rocks (Calcare Cavernoso).
A genetic interpretative model is proposed using geological and geomorphological field data that cover these deposits, detailed stratigraphical descriptions and laboratory microanalyses (optical microscope, cathode-luminescence, chemical and isotopic analysis).
The Susa Valley pseudocarniole genesis is here interpreted as a consequence of the relevant volume reduction induced by dissolution of gypsum/anhydrite rock masses: this phenomenon starts with hydrothermal fluid ascension and consequent dissolution. The overhanging dolomite and carbonate rocks are deeply transformed by means of gravity collapse, deep dissolution and later by karst phenomena.
Dedolomitization processes induce very important transformation of parent rock and new facies are formed, characterized by progressively stronger internal re-arrangement and by accumulation of residual insoluble products.
After local Alpine structures uplift and the local processes of exhumation and the relief formation, a karst landscape forms; the karst flow paths mainly involve the previously formed pseudocarniole: some rock masses are further reworked by means of transport and sedimentation processes, typical of hypogenic karst environment, as shown by the close association of sedimentary structures: fill-in channels, spindle-shaped tubes and cavities, laminations and ripples, water splash marks on the strata surfaces.
In the sector characterized by a significant reworking of the original carbonate rocks so that their earlier structures and textures are completely obliterated. Thus new rocks are created, needing the introduction of the new name, pseudocarniole; this provisional name indicates the similarity of appearance but the different origin and age with respect to the "true carniole" and also to the deformed sulphate evaporites.
In this study, on the basis of preliminary pollen analysis and detailed stratigraphical studies have been furnished some results about age of pseudocarniole development. Collected samples of pseudocarniole contained pollen of Upper Pliocene-Early Pleistocene arboreal taxa usually distributed on coastal environments. Moreover, the relationships among the pseudocarniole and natural landforms or man-made structure indicate that the genetic process of the pseudocarniole formation took place between the upper Pliocene (at least) and the Present.
Therefore, the genesis of the pseudocarniole have started at the very beginning of the recent evolution of the present-day Alpine relief.
We think that this record is very important to define geomorphological evolution of Western Italian Alps because in the mountainous sector the recent sedimentological record known starts since Middle Pleistocene (till); the Pliocene sediments ("Villafranchiano" facies) are preserved only at the terminal parts of mayor valleys.
So, the pseudocarniole are oldest post-orogenic sediments preserved in the Western Italian Alps?

T52-19 Poster Costagliola, Pilar

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ARSENIC UPTAKE BY NATURAL CALCITES: PRELIMINARY RESULTS FROM SEQUENTIAL EXTRACTION OF TRAVERTINES (SOUTHERN TUSCANY, ITALY)

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Key terms: Arsenic; Calcite; Sequential extraction; Travertine

A recent EPR-ESE study of Quaternary travertine deposits in Southern Tuscany (Pecora Valley; Italy) demonstrated that As enters the lattice of natural calcite through a $CO_3^{2-} = AsO_3^{3-}$ substitution (Di Benedetto et al., 2006). Since the EPR-ESE spectroscopy does not allow a quantitative determination of As, the actual role that calcite may have in natural processes in sequestrating arsenic remains highly speculative.
In this work, we compared two extraction procedures to quantify the As content in the travertine samples studied by Di Benedetto et al. (2006). Since the traditional procedures are mostly codified for cations, we developed a new one (hereafter "A"), which takes into account the mineralogy of travertines (dominant calcite with a non negligible fraction of Fe-oxyhydroxides). This procedure was compared with the "classical" method (hereafter "B") used to recover toxic elements from mineralogical matrices (Matera et al., 2003).
According to Procedure A, As has been extracted *first* from Fe-oxyhydroxides by using a NaOH solution, able to desorb As in an efficient and rapid way (Jang et al., 2005), at pH 12.5 for about 20 hours. The residue was then attacked with aqua regia to determine the As bound to the carbonatic fraction. According to Procedure B, the As bound to calcite is determined by an acetic acid extraction at a pH of about 5; the recover of As adsorbed onto Fe-oxyhydroxides takes place *after* the acetic acid extraction employing an aqua regia attack. Thermodynamic data indicate that - at a pH value of 5 - As anions are rapidly adsorbed onto the Fe-oxyhydroxides surface (Drever, 1997). Therefore, Procedure B may lead to underestimate the As content in the carbonatic fraction and vice versa to overestimate the metalloid in the Fe-oxyhydroxides fraction.
The calcimetric analyses of the samples allowed us to calculate the amount of calcite and therefore to determine the absolute As concentration in the mineral. Accordingly, the As content in calcite ranges from 137 to 270 mg/kg following Procedure A, and from 109 to 156 mg/kg according to Procedure B. Therefore, the "classical" protocol (B) gives values systematically lower (35%) than those obtained with Procedure A, suggesting that the use of the acetic buffer may lead to underestimate the value of As bound to calcite.
At the current state of the art, however, it is not possible to exclude that part of the As released from Fe oxyhydroxides in Procedure A could be adsorbed onto the surface of calcite, thus leading eventually to overestimate the As bound to the carbonate phase. In spite of this uncertainty, our study confirms that substantial amounts of arsenic (from a minimum content of 109-156 mg/kg to a maximum of 137-270 mg/kg) have been trapped by calcite during travertine formation in the Pecora Valley.

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SESSIONE T53

Aspetti strutturali, energetici e dinamici delle trasformazioni mineralogiche in condizioni non ambiente

T53-1 Key Lecture Boffa Ballaran, Tiziana

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THE HELP OF HIGH-PRESSURE X-RAY DIFFRACTION IN UNDERSTANDING THE DEEP EARTH

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Key terms: High-pressure X-ray diffraction; mineralogy; Earth's interior

In order to constrain the structural evolution and the geological processes of the Earth's and planetary interiors, knowledge of the physical and chemical properties of the constituent minerals, as well as their variations as a function of pressure, temperature and composition, is required. The technical developments of the past decades have improved the measurement capability and the accuracy of the data collected at high pressures and improved our understanding of the deep Earth. Examples of different experimental studies will be presented. In particular results obtained under hydrostatic and non-hydrostatic condition will be discussed in relation to the high-pressure ferro-elastic phase transition in $(K,Na)AlSi_3O_8$ hollandite-type structure. X-ray single-crystal high-pressure data on $CaIrO_3$ perovskite and postperovskite phases will be compared with experimental and computational results obtained for the $MgSiO_3$ lower mantle phases in order to discuss their use as possible analogs.

T53-2/3 Invitato Scandolo, Sandro

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QUANTUM SIMULATIONS AS A WINDOW INTO THE INTERIORS OF PLANETS

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