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ABANDONED AND DEACTIVATED MINES IN THE EASTERN ITALIAN ALPS (TRENTINO-ALTO ADIGE, VENETO, FRIULI-VENEZIA GIULIA)

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Abstract
At the end of a long research regarding the historical and technical evolution of the mining activity in the Italian side of the Alps (the first news was presented during the 12th International Congress of Speleology at La Chaux-de-Fonds, 1997) this poster shows the situation of the eastern regions (as Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia) by means of a chorographic map at a 1:500 000 scale in which the location of a single mine is represented with a specific simbology. As reported in other occasions and mainly during a meeting arranged by the Regione Lombardia (Milano 2004; see also the Proceedings of the VII National Meeting of Speleology in Artificial Caves, Urbino 2010), the aim of these researches is to consider the preservation state of the exhausted or abandoned mines in order to evaluate the possibility (for the most interesting and significant ones) of their recovery for tourist or didactic and museum object, as in other situations formerly achieved (noteworthy, by this regard, the ancient mines of Monteneve and Predoi (Alto Adige), the mines of Valle Imperina (Veneto) or the Mining Park of Calceranica (Trentino) and the Cave del Predil Mining Museum (Friuli).
Keywords: mines archaeology, mining parks, ore deposits.

Riassunto
A conclusione di un pluriennale programma di ricerche relativo ai siti minerari abbandonati e dismessi delle Alpi italiane, di cui venne data inizialmente notizia al 12° Congresso Internazionale di Speleologia (La Chaux-de-Fonds, 1997), questo poster illustra sinteticamente la situazione mineraria delle Alpi orientali italiane (con le regioni Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia) mediante una carta corografica alla scala di 1:500.000 in cui viene riportata l'ubicazione dei principali giacimenti minerari insieme con la messa in evidenza delle specifiche mineralizzazioni. In particolare secondo la Carta mineraria d'Italia (1936) su circa 50 siti minerari solo poco meno della metà erano ancora attivi, mentre nel 1975, nell'indagine compiuta dal Servizio Geologico d'Italia, dei 63 siti considerati solo 14 risultavano attivi di cui la metà prevalentemente metalliferi (con piombo, zinco, rame, bario) e gli altri relativi a fluorite, caolino e bentonite. Come già precisato in varie occasioni e specialmente nel corso di una indagine sullo stesso argomento effettuata per conto della Regione Lombardia (Cfr. gli Atti del VII Convegno Nazionale di Speleologia in Cavità Artificiali, Urbino 2010) scopo di queste ricerche era l'esame dello stato di conservazione delle miniere non più attive (per esaurimento o abbandonate per scarsa convenienza economica) al fine di valutare la possibilità di una loro valorizzazione a scopo turistico o didattico-museale, come è già avvenuto in alcuni casi relativi alle regioni qui considerate (San Martino Monteneve e Predoi in Alto Adige, Area mineraria della Valle Imperina nel Veneto, Parco minerario di Calceranica in Trentino, Museo minerario di Cave del Predil in Friuli).
Parole chiave: *archeologia mineraria, parchi minerari, giacimenti minerari.*

Among the several researches carried out since many years on industrial archaeology, those referring to the mining activity hold a peculiar importance, mainly as a noteworthy element in the territorial framework and by the human impact on the natural environment. The existence in the Alpine region of many ore bodies was surely one of the main reasons that favoured the human presence since the prehistoric times. Consequently, very numerous are the signs, in this region, of the utilization of the mining resources, even if actually most of the mines is abandoned, both for their exhaustion and for their exploitation unsuitability.
If we consider only the southern side of the Alps, within the actual Italian boundaries, after an increase during the Roman times, the mining activity showed a new intensity from the late Middle Ages with a prevalence of the metalliferous minerals production (gold, silver, lead-zinc, copper and mainly iron, whose processing was enabled by the charcoal use obtained from the wide forests covering the mountains and the Alpine valleys). In the first half of the XIX century, in spite of the exhaustion of many mines or the abandonment of others due to lack of charcoal (inadequately replaced by modest fossil coal bodies), more than 150 active, and about a hundred inactive, metalliferous mines were yet in the Italian Alps. Afterwards, in the first half of the XX century, we can observe a strong decrease of the active metalliferous mines (less than fifty). In the second half of the same century many other mines were abandoned, so that actually there are only less than forty, almost all non metalliferous.
As a consequence of this progressive decrease of the mining activity, in the Italian valleys and mountains of the eastern Alps there were in 1975, according to a

specific research of the Italian Geological Service, only 14 mines in activity, mainly metalliferous.

At the end of a long research about the historical and technical evolution of the mining activity in the Italian side of the Alps (the first outcomes were presented during the 12th International Congress of Speleology at La Chaux-de-Fonds, 1997) this shows the situation of the Italian Alpine eastern regions, by means of a map at a 1:500 000 scale in which the location of a single mine is represented with a specific simbology. The map shows also the mineralization and other significant geological and logistic features of the mining sites.

As reported in other occasions and mainly during a meeting arranged by the Regione Lombardia (Milano 2004; see also the Proceedings of the VII National Meeting of Speleology in Artificial Caves, Urbino 2010) another peculiar aim of these researches is also to consider the preservation state of the inactive Alpine mines in order to evaluate the reclaiming feasibility of the most interesting and significant ones (as typical evidence of industrial and mining archaeology), for tourist, museum and didactic facilities, as in other European countries and Italian regions formerly achieved. Noteworthy, by this regard, among many and significant cultural enterprises, the reclaiming of the ancient mines of Monteneve / Schneeberg and Predoi / Prettau in the Alto Adige / Südtirol region with the small but interesting museum of Vipiteno / Sterzing, the tourist reopening of the mines of Valle Imperina (Veneto) or the start up of the Mining Park of Calceranica (Trentino) and of Cave del Predil Mining Museum (Friuli).

The *San Martino Monteneve* lead-zinc ore deposit includes various veins embedded in metamorphic rocks. Besides argentiferous galena and blende also accessory minerals as quartz, garnets, horneblende, biotite, tourmaline had mined together with other metallic sulphides. Because its altitude (2300-2400 m above sea level) upon the watershed between the Ridanna and Passiria valleys, the exploitation began onkly in the medieval times and the production stopped at the end of the XX century (1979).

The *Predoi* copper mine in Aurina Valley (Ahrntal) began its activity during the XV century. The mineral (calcopyrite) is included in chloriteschists together with talc, micaschists and serpentinite. Its exploitation ceased in 1971.

In the *Imperina Valley*, tributary of the river Cordevole, nearby Agordo, the mining exploitation (copper and silver) developed during more than five centuries, and mainly under the Venetian Republic. It ceased definitively in 1962. Today it is possible to see yet many structures of the past activity, as hoisting shafts, adit tunnels with, outside, fusion and refining furnaces.

The *Mine Park of Calceranica*, is so called by the name of the commune placed on the shore of the Caldonazzo lake at the west end of Valsugana. It refers to a pyrite mine (with 40 km of tunnels) exploited from the medieval times until 1964. At present one can visit only a part of the "Leila" tunnel with outside a stretcht of the old decauville used for the mineral carriage.

The *Raibl International Geo-mining Park* has been recently set up around the site of the Raibl lead-zinc ore deposit nearby the Cave del Predil Museum. The Raibl is one of the most ancient mine in Europe and its exploitation ceased in 1990. It is possible to visit this mine (on the west side of the Rio del Lago valley, 8 km south of Tarvisio) by an electric decauville along the Kaiser Franz tunnel. Besides lead and zinc, the past exploitation gave also other minerals as baryte, fluorite, pyrite and calcopyrite.

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