

VOLCANOGENIC MASSIVE SULPHIDE DEPOSITS IN SOUTHERN CRYSTALLINE BASEMENT OF EASTERN ALPS (NE ITALY)

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Numerous massive sulphide deposits (e.g. Val Imperina, Siror-Terre Rosse, Val Sella, Calceranica, Vetriolo) are located within a ENE-WSW belt some 10 km wide and about 100 Km long in the Southern Crystalline Basement of the Eastern Alps, from Agordo to Trento. They are conformable stratiform orebodies 1-4 m thick and variable in tonnage between 1-3 Mt; they are hosted by Ordovician-Silurian volcanosedimentary series including phyllites and quartzitic phyllites (locally graphitic), with interbedded metarhyodacitic ignimbrites derived from crustal anatexis and a few metabasites with intraplate alkali-basalt affinity. The rocks and mineralisation suffered greenschist facies metamorphism during the Hercynian Orogeny. The various orebodies are commonly zoned and have similar paragenesis with pyrite, sphalerite, galena, chalcopyrite and arsenopyrite, minor pyrrhotite, tetrahedrite, sulphosalts, magnetite and rare electrum. Quartz, carbonates, chlorite and sericite are common gangue minerals.

Chemical analysis of several composite samples indicate Zn from 0.05% to 9.2%, Pb from 0.03% to 6.5%, Cu from 0.02% to 4.9%. The gold content grades up to 3.6 ppm: the highest concentrations are more frequent in orebodies of the western sector of the belt. Positive correlations are mainly found between gold content and Co (0.91), Fe (0.80), Sb (0.80) Cu+Zn+Pb (0.79), Sn (0.75).

SUPERPOSITION OF HERCYNIAN AND ALPINE DEFORMATIONS IN THE MALAGUIDE COMPLEX (BETIC CORDILLERAS, SPAIN)

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The Maláguide Complex, located in the Internal Zones of the Betic Cordilleras, is made up by Palaeozoic metamorphic and sedimentary rocks that are overlaid unconformably by Triassic to Oligocene sedimentary rocks. Below this sequence there are gneisses and, at the bottom, peridotites. In the Maláguide units of the eastern Betic Cordilleras only the upper parts of the sequence is represented. The study of the structures that affect to the Palaeozoic and Mesozoic rocks, in the Montes de Málaga area, allow us to establish the main features of the alpine and hercynian deformations.

The first hercynian structures are small size N-S oriented folds, vergent toward the west, which develop an axial plane foliation. These folds are superposed by later N-S oriented folds that are vergent toward the east, which have hectometric to kilometric sizes, reverse limbs and an axial plane crenulation cleavage. Finally, S-C structures with a top-to-the-east sense of movement are developed at subhorizontal shear zones. The orientation and vergence of the second hercynian folding stage are different of those described by Chalouan (1986) in the Rifian Cordilleras and by Balanyá (1991) in the westernmost part of the Betic Cordilleras. All these structures are previous to the basal unconformity of the Triassic rocks.

The first alpine deformations are N40°E oriented folds, vergent towards the south-east which locally develop reverse limbs. Those folds are cutted by reverse faults with a top-to-the-east sense of movement. Basaltic dykes, 22-23 m.y. old (Torres-Roldán et al., 1986), that intruded Palaeozoic rocks, are cutted by some of these reverse faults.

After those deformations, an extensional system composed by low angle normal faults with a top-to-the-southwest sense of movement in generated. These later faults are folded by open N-S oriented folds. The faults of this extensional system are recovered unconformably by Upper Aquitanian - Lower Burdigalian sedimentary rocks (Brecha de la Vinuela). Palaeogene flysch materials overlie the Brecha de la Vinuela rocks and are usually interpreted as a gravitational sliding. Finally there are low angle normal faults with a top-to-the-southwest sense of movement that are active until Tortonian times, and they are affected by E-W oriented open folds.

PRE-ALPINE EVENTS AT THE NORTHERN EDGE (KÜTAHYA-BOLKARDAGI BELT) OF TAURIDE-ANATOLIDE PLATFORM

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Kütahya-Bolkardagi Belt (KBB) is an Alpine unit, characterising the northern edge of the Mesozoic Tauride-Anatolide Platform. Late Cretaceous closure of the northern branch of Neotethys, ophiolite obduction, deformation and metamorphism within the KBB overprinted and obscured the Hercynian events recorded in the Paleozoic aged basement units.

The basement units are best exposed in Konya and Kütahya regions. The Bozdağ marbles, the oldest unit in the area consist of Silurian-Early Devonian shelf carbonate which are intensively intruded by diabase dykes. Halici Group of Carboniferous age comprises a thick sequence made up of olistostromes with huge neritic and hemipelagic