Window, where the maximum age of the brittle deformation at 20 +/-1 Ma is given by the ZFT ages, whose closure temperature is ~240°C±10°C (BERTRAND et al., in prep.).

The second brittle deformation phase corresponds to an orogen-perpendicular extension. This last one becomes more important toward the South of the belt, especially in the Briançonnais zone, from the Vanoise massif to the North of the Argentera massif. This phase appears to be linked to the current activity of the belt, as shown by seismotectonics, especially in the Briançon area (review in SUE et al., 2007).

This paper focus on a new global statistical approach of the sub-databases available, that we compile in a huge database of more than 12.000 individual measurements all-around the bend of the Western/Eastern Alps. Beyond the paleostress mapping, we propose to statistically characterize both extensional phases. Assuming that the second one (perpendicular) is linked to the current activity of the belt, itself ruled out by isostatic processes, we concentrate on the first orogen-parallel extension, which origin remains a matter of debate. “Unfolding” the alpine arc, using a simple geometrical modeling of the belt, allowed unraveling the surprising stability of the orogen-parallel extension in the Whole Western, Central, and Eastern Alps. This approach rises up the issues of (i) the geodynamic origin of this extension developed during Miocene times within an active collisional belt; (ii) the precise timing of its development; and (iii) its continuity between Western and Eastern Alps in terms of both kinematics and time.

ALLANIC, C. & GUMIAUX, CH. (2013): Are there any active faults within the Lepontine Dome (Central Alps)? – Bull. Soc. Geol.. Fr., 184, in press.

SUE, C., DELACOU, B., CHAMPAGNAC, J.-D., ALLANIC, C., TRICART, P., BURKHARD, M. (2007): Extensional neotectonics around the bend of the Western/Central Alps: an overview. - Annu. Rev. Earth Planet. Sci., 96: 1001–1029.

The abandoned Remshnig mine, occurrence of rare minerals; Palaeozoic or Tertiary ore mineralization?

Trajanova, M.[1] & Zorz, Z.[2]

[1] Geological survey of Slovenia, Dimiceva ulica 14, 1000 Ljubljana, Slovenia (mirka.trajanova@geo-zs.si)
[2] Pod Perkolico 52, 2360 Radlje ob Dravi, Slovenia (zmago.zorz@gmail.com)

Parallel with the Pohorje mountainous chain and north of the Drava River, a hilly area of Kobansko extends in northern Slovenia. In the central part of the region, polymetallic Remshnig mine is situated in the thrust zone of weakly metamorphosed old Palaeozoic rocks of the Magdalensberg formation, the Remshnig nappe in the hanging wall, and the retrogressed schists of the Pohorje formation in the footwall. Though the Remshnig ore deposit is known more than 250 years, its origin and mineral association is still not known completely. Some new findings are presented in this contribution. The results are based on field observations and SEM investigations.

Macro- and microstructures of the rocks reveal several phases of tectonic activity, including twice reactivated subhorizontal shear movements, due to which dynamometamorphic imprint can be followed in all rocks. The first one reflects as ductile deformations, yielding mylonitization and foliation. The second shear produced slaty cleavage, which broadly follows foliation. The origin of these two structures is associated with upper Cretaceous nappe stacking and Tertiary Austroalpine eastward escape (e.g. FODOR et al., 1998, 2002, 2008). Own unpublished model of the Pohorje tectonic block origin suggests that Pohorje and Kobansko/Kozjak were still one common block at the time of the Pohorje granodiorite magma emplacement in Lower Miocene and were separated later.

Hydrothermal ore mineralization and silicification follow slaty cleavage in partly brecciated marmorized dolomite lenses and subordinately in metatuffites and phyllites. Younger oblique

fractures cut foliation and slaty cleavage, developed as a consequence of renewed shearing. Secondary cleavage plains were formed indicating dextral sense of shear. All structures are cut by younger subvertical faults of prevailingly southwest-northeast trend, and subordinately transversely to this direction. These fractures are not silicified and contain no primary (sulphide) ore mineralization.

The present state of investigations does not allow strict definition of the Remshnig ore deposit genesis. Nevertheless, some important relations can be drown, which neglect its Palaeozoic origin: ore mineralization occurs within the thrust zone; sulphide mineralization and strong silicification followed cleavage, which is of Tertiary (probably of Miocene) origin; the Kobansko block separated from the Pohorje block in middle to upper Miocene and Kobansko was until then, within the impact area of the granodiorite intrusion; mineral composition and sulphur isotope composition of the Remshnig and Okoska gora (Pohorje) ore deposits are closely related (DROVENIK et al., 1976, 1980). Consequently, there is a great probability that the Remšnik ore mineralization is connected to the Miocene Pohorje magmatism, as has already been proposed by some authors. The question is, whether the mineralization could be related to remobilization of pre-existing ore minerals.

Characteristic Remshnig mine ore veins are composed mostly of quartz and carbonates, of which the most frequent is dolomite. Paragenesis of predominant Pb, Cu and Zn silver-bearing sulphide ore minerals is represented mostly by chalcopyrite, galenite, sphalerite and pyrite. They are associated with numerous secondary minerals. Among them, coatings of two rare hydrous sulphates of Cu and Zn occur, found for the first time in Slovenia. The emerald green, tabular monoclinic crystals of slightly rounded shape and only some tenth of millimetre in size were determined as ramsbeckite. Platy, hexagonal crystals most probably belong to namuwite. Its submicroscopic structure and small quantity have not permitted reliable determination, yet.

DROVENIK, M., DUHOVNIK, J. & PEZDIČ, J. (1976): Izotopska sestava žvepla v sulfidih rudnih nahajališč v Sloveniji. - Rud.-Metal, zb., ê-3, Ljubljana.

DROVENIK, M., PLENIČAR, M. & DROVENIK, F. (1980): Nastanek rudišč v SR Sloveniji. –Geologija, 33, 1-157, Ljubljana.

FODOR, L., JELEN, B., MÁRTON, E., SKABERNE, D., ČAR, J. & VRABEC, M. (1998). Miocene-Pliocene tectonic evolution of the Slovenian Periadriatic Line and surrounding area - implication for Alpine-Carpathian extrusion models. - Tectonics, 17: 690–709.

FODOR, L. JELEN, B., MÁRTON, E. ZUPANČIČ, N., TRAJANOVA, M., RIFELJ, H., PÉCSKAY, Z., BALOGH, K., KOROKNAI, B., DUNKL, I., HORVÁTH, P., HORVAT, A., VRABEC, M., KRALJIĆ, M. & KEVRIĆ, R. (2002): Connection of Neogene basin formation, magmatism and cooling of metamorphic rocks in NE Slovenia. — Geologica Carpathica, 53, spec. issue: 199–201.

FODOR, L. I., GERDES, A., DUNKL, I., KOROKNAI, B., PÉCSKAY, Z., TRAJANOVA, M., HORVÁTH, P., VRABEC, M., JELEN, B., BALOGH, K., FRISCH, W. (2008): Miocene emplacement and rapid cooling of the Pohorje pluton at the Alpine-Pannonian-Dinaric junction: a geochronological and structural study. - Swiss Journal of Earth Sciences, 101 Supplement 1: 255–271. DOI 10.1007/s00015-008-1286-9