Structural development of a mineralized caldera and associated volcanism from the Rachaite volcanic complex, Northern Puna, NW Argentina

R. Heidorn[1,2], F. Neubauer[2], W.H. Paar[1]

[1] Inst. für Mineralogie, Univ. Salzburg, [2] Inst. für Geologie und Paläontologie, Univ. Salzburg, Österreich

In the Central Andes epithermal precious- and base-metal deposits play an important economic role. In the back-arc setting respectively Altiplano-Puna plateau the mineralisation is hosted by domes, stocks or plutons within high-level magmatic systems such as calderas or stratovolcanoes. Epithermal deposits form at shallow depths, and upper plate stress conditions play a crucial role for the ascent of magma and associated ore-mineralisation. Several ore districts of Miocene to Pliocene age associated with transversal volcanic zones within Argentina, Bolivia and Chile are aligned along NNW to NW-trending lineaments. Interestingly, little attention has been given so far for the Lipez fault system, a wrench corridor extending from the far NW of Argentina into the Sur Lipez Province of Bolivia and terminating in Chile. It consists of several sub-parallel faults and is associated with a broad transverse Miocene to Pliocene volcanic zone with numerous volcanic centers and mineralised calderas. The Rachaite VC is located at the intersection of the Lipez fault system and of north-trending folded and thrusted mineralised Paleozoic Formations, which bear numerous mineralized polymetallic anticlinal structures in Bolivia.

The structurally controlled Pb-Zn-Ag deposit of Rachaite respectively Chocaya mineralization is part of the calc-alkaline Rachaite volcanic complex (VC) and is located at the southern extension of the NW-trending Lipez fault system. The Rachaite VC depicts in its centre a caldera of more than 5 km diameter in E-W direction and of 3.5 km in N-S direction. A fault-bounded dome-like structure of andesitic composition located within the center of the caldera is strongly altered and hosts mainly N-trending vein-type and stockwork lead, zinc and silver mineralizations. The main alteration depicts sericitisation, silicification and propylitisation.

Paleostress data suggest a minimum of four deformation events. Within the Rachaite caldera more than 30 faults were recognised, analysed and placed into a relationship with the deformation events observed at large scale. D1 corresponds to a stress field indicating N-S shortening and subvertical extension. This resulted in N-S striking extensional dykes of dacitic composition and the emplacement of vein-type ore with colloform textures within the Chocaya mineralization and the activation of Lipez faults with dextral strike-slip displacement. Other structures within the Rachaite caldera are E-trending faults, which indicate dip-slip displacement. D2 is related to E-W to SE-NW shortening depicting a sequence of three deformation sub-events: D2a structural features comprise NW-trending faults with reverse-sinistral oblique-slip and pure reverse dip-slip displacement. Lipez faults are reactivated by D2a indicated by left lateral displacement. D2b generated E-trending closely spaced extensional joints and mineralised veins and veinlets. D2c structures are indicated by N-S striking faults with reverse dip-slip and reverse-dextral oblique-slip and by NE-trending faults like the Doncella fault (Fig. 3) with normal-sinistral oblique-slip and pure sinistral strike-slip displacement. The youngest structural features belong to D3 and are N to NNE-trending faults showing left-lateral strike-slip displacement.

Computergestützte 3D-Rekonstruktion von Granaten und deren Einschlüssen

K. Heimlich

Institut für Geologie und Paläontologie, Univ. Salzburg, A-5020 Salzburg, Österreich

Diese Arbeit beleuchtet einen Ansatz zur computergestützten 3D-Rekonstruktion von Mikrostrukturen in Gesteinen. Die Objekte des Interesses sind Granatporphyroblasten aus Glimmerschiefern des Moravikums der Böhmischen Masse, Waldviertel/ Österreich. Zur Lokalisation geeigneter Granatmineralkörner kommt die Mikro-Computertomographie zum Einsatz. Um eine möglichst hohe Auflösung in der eigentlichen Rekonstruktion zu erreichen, wird das Verfahren der Serienerosion in Kombination mit Mikrosondenscan angewandt. Die geometrische Referenzierung der akquirierten Bilder ist durch Anwendung von Algorithmen auf Basis der affinen Transformation gewährleistet. Nach Aufstapelung der Aufnahmen zu einem Voxelvolumen, werden die Granate mit spezieller Rücksicht auf ihre Einschlussstrukturen visualisiert.