SYNTECTONIC POLYSULPHIDE MINERALISATION IN THE BRABANT MASSIF

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The Early Palaeozoic rocks of the Brabant Massif underlie most of the Flemish part of Belgium. Some episodes of its history may have been favourable for ore formation, such as subduction-related Ordovician volcanic and intrusive activity, the Acadian (Late Caledonian) orogeny and metamorphism, and Variscan block faulting. A metallotect near Sint-Pieters-Kapelle is currently the most promising exploration site in the Brabant Massif, with evidence of syntectonic hydrothermal mineralisation and alteration.

The mineralisation, which is recognised in the boreholes near Sint-Pieters-Kapelle, consists mainly of pyrite, marcasite, sphalerite, chalcopyrite and galena. The paragenetic relations are generally clear, and show evidence of four main phases, starting with (1) pyrite, then (2) pyrite and marcasite, followed by (3) sphalerite and chalcopyrite and (4) chalcopyrite and galena. In the richest drilling (114E92) this mineralisation is concentrated in quartz veins parallel to the cleavage fabric. This implies that mineralisation occurred late during cleavage formation. The deformation of the veins and mineralised pressure shadows prove that deformation was still active during precipitation of sulfphides.

Several alteration zones, with different intensities of sericitisation and silicification, can be distinguished in the vertical sections provided by the boreholes. The most intensely mineralised intervals coincide with, or are adjacent to, the strongest altered zones. The composition of the slickenfibers shows that the alteration is syntectonic. The temperature during the hydrothermal activity (between 320°C and 350°C) can be estimated from homogenisation temperatures of fluid inclusions (up to 320°C), the presence of pyrophyllite (formed at temperatures exceeding 300°C) and marcasite (stable at temperatures lower than 350°C). Melting temperatures in fluid inclusions show that sulphides precipitated from low saline NaCl - CO_2 - H_2O fluids (2,5 eq wt% NaCl).

GEOCHEMICAL STUDY OF THE LEUCOGRANITES OF THE NORTHERN VOSGES

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At the end of the Variscan orogeny the Kagenfels granite intruded along extension faults in the Massif du Champ du Feu, Northern Vosges. The granite consists of an EW-oriented limb and a NS-oriented limb, which are both discordant with the structures of the whole massif. There is a transition from a medium-grained granite in the EW-oriented intrusion to a granophyric and 'rhyolitic' facies (most southwards) in the southern extension.

Major and trace element analyses revealed that the rhyolitic facies is less differentiated than the granophyric and medium-grained granite. Further sampling and major and trace element analyses has been carried out to determine : (1) whether the discontinuous transition from the less differentiated rhyolitic facies to the more differentiated granophyric facies and medium-grained granite is an artefact of limited sampling of the rhyolitic facies, or reflects two separate intrusion phases, (2) which accessory minerals played an important role during fractional crystallisation, (3) whether there is a genetic relation between the Kagenfels intrusion and other late-stage granitic bodies from the Northern Vosges, in particular some smaller intrusions in the immediate neighbourhood of the Kagenfels.

The initially proposed intrusion model could be refined. Three intrusive episodes are recognised which gradually pass into each other. The decrease of light and middle rare earth elements (REE) during differentiation is attributed to the crystallisation of accessory quantities of monazite and apatite, and could be modelled using experimentally determined K_D-values for silicium-rich systems.

The very similar trace element patterns of some smaller intrusions (Baronsmatt granite, Rohrbach granite) argue for a cogenetic origin but other smaller intrusions (Bernardsbruch granite) do not show any relationship with the Kagenfels granite.