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ORIGIN AND MIGRATION OF PALAEOFLUIDS IN THE LOWER CARBONIFEROUS OF THE NAMUR SYNCLINE AND VERVIERS SYNCLINORIUM, SOUTHERN BELGIUM

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During or just before the Variscan folding, conjugated shear veins, sigmoidal en-echelon and extensional calcite veins developed in the eastern part of the Namur syncline. Cathodoluminescence petrography and stable isotope analyses of these veins and of the surrounding limestones indicate precipitation of the calcite cement from a fluid buffered by the rock. In the area studied, only a limited amount of fluid migrated through the Dinantian during the Variscan compression (Muchez *et al.*, 1995). Microthermometry of the fluid inclusions in the Variscan compression (Muchez *et al.*, 1995). Microthermometry of the fluid inclusions in the Variscan calcites indicates precipitation from a low salinity fluid (2 - 7.8 eq. wt%NaCl) at a temperature of -150°C. Recrystallisation of some of the calcites occured in a high salinity fluid at a temperature above 170°C. This high temperature implies an upward migration of fluids from deeper parts of the basin after the main period of Variscan deformation.

After the Variscan deformation and likely after the Cimmerian uplift (Middle Jurassic), Mississippi Valleytype mineralisations formed in the Carboniferous of southern Belgium. Stable isotope and microthermometric analyses of ferroan calcite veins associated with this Pb-Zn mineralisation indicate that the original fluids had a low δO (-5.2 ‰ SMOW) and that these fluids became enriched in ^{18}O by waterrock interaction. Flow of this water into the deeper subsurface was likely gravity-driven and took place from the uplifted parts of the Variscan orogen towards the foreland basin (Muchez *et al.*, 1994). After the Cimmerian uplift, the Visean limestones became karstified in a semi-arid environment likely during the late Jurassic. Comparison of the orientation of later ferroan and non-ferroan calcite veins with the palaeostress analyses carried out by Vandycke *et al.* (1991) in the Mons basin, combined with a mineralogical and geochemical study of the cements indicates that :

- moderate saline fluids (3.7 - 16.3 eq. wt%NaCl) with a relatively low oxygen isotopic compostion (-6 to 0 ‰ SMOW) migrated through the subsurface possibly in relation with a Late Campanian NW-SE extension and later with the Early Maastrichtian dextral strike-slip faulting ;
- high salinity $CaCl_2$-NaCl brines (14 - 18 eq. wt%$CaCl_2$) with a temperature around 50°C circulated through vertical fractures and faults ;
- cool, meteoric fluids could have flowed through the subsurface during several periods in the Cretaceous and Tertiary.

REFERENCES

MUCHEZ, Ph., SLOBODNIK, M., VIAENE, W. & KEPPENS, E., 1994. *Geology*, 22: 1011-1014.
MUCHEZ, Ph., SLOBODNIK, M., VIAENE, W. & KEPPENS, E., 1995. *Sediment. Geol.*, 96: 191-200.
VANDYCKE, S., BERGERAT, F. & DUPUIS, Ch., 1991. *Tectonophysics*, 192: 261-271.

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