Reconstruction of the prograde P-T history of the migmatitic paragneiss from the Filali metamorphic unit via melt-reintegration approach and thermodynamic modelling (Internal Rif, Northern Morocco).

Abdelkhaleq Afiri*[1], Oumaima Essoualeh[2], Abdelmouhsine Aghzer[2], Abderrahim Essaifi†[3], Souhaila Kajji[4], Ouafa Farchat[4], and H. Si Mhamdi[5]

[1]Department of Geociences, Faculty of Sciences and Techniques Errachidia, Moulay Ismail University,Morocco – Maroc

[2]Department of Geology, Faculty of Sciences, Chouaib Doukkali University El Jadida, Morocco – Maroc

[3]Department de Géologie, Faculté des Sciences Semlalia, Université Cadi Ayyad, BP. 2390, Marrakech, Maroc – Maroc

[4]Department of Geosciences, Faculty of Sciences and Techniques Errachidia, Moulay Ismaïl University of Meknes, BP 509 Boutalamine, 52000 Errachidia, Morocco – Maroc

[5]Department of Geociences, Faculty of Sciences and Techniques Errachidia, Moulay Ismail University,Morocco – Maroc

Résumé

The structural and metamorphic evolution of the polymetamorphic migmatitic paragneisses of the Filali unit from the Beni Bousera massif (inner Rif, Morocco) is related to the underlying shear zones which juxtapose crustal units against an underlying sub-continental peridotite body. This syn-D2 shear phase is characterized by NW-SE to N-S streching lineation with a N to NW extensional movements. The petrological and thermobarometric study of the migmatitic paragneisses is marked by the superposition of three tectonometamorphic events M1, M2 and M3, composed by the respective mineralogical assemblage : garnet1 (core)-biotite-kyanite-rutile-plagioclase-muscovite, garnet2 (inner rims)-biotite-sillimanite-plagioclase-feldspar K-rutile-ilmenite and garnet2 (outer rims)-biotite-sillimanite-plagioclase-feldspar K-cordierite-ilmenite.
Phase equilibrium modelling (pseudosections) combined with multi-equilibrium thermobarometry allowed to constrain the P-T conditions of the M2 and M3 events, which are of 7 kbar and 750∘C (thermal peak event) and 3.5 kbar and 685∘C (retrograde event), respectively. The obtained P-T conditions suggests a clockwise retrograde P-T path characterized by a strong isothermal decompression.

The initial pre-melting composition of the gneiss under the kyanite stability field was then calculated by reintegrating the melt lost during their partial melting under peak of metamorphism established in the sillimanite stability field. This composition allowed the exploration

*Auteur correspondant: afiriabdelkhaleq@yahoo.fr

†Intervenant

of phase equilibria under sub-solidus conditions and the estimation of pre-melting M1 equilibrium conditions which are of 9.3 kbar and 660∘C.
Geochronological data available on the Massif show that the MP-MHT tectonometamorphic event (M1) is related to a Permo-Carboniferous thickening event, while the MP-HT (M2) and LP-HT (M3) events are related to the Alpine orogeny (Oligo-Miocene). The overall P-T path obtained suggests a strong isothermal decompression, related to a significant crustal attenuation in the Oligo-Miocene. This extensional tectonometamorphic event caused the juxtaposition of units showing a thermal metamorphic gaps which resulted in the melting of the Filali gneiss. The exhumation of the latter during the lower Miocene back-arc extension is associated with the westward retreat of the Alpine subduction (slab roll back).

Mots-Clés: Migmatitic paragneisses, isothermal decompression, thermodynamic modelling, melt reintegration, Rif belt.