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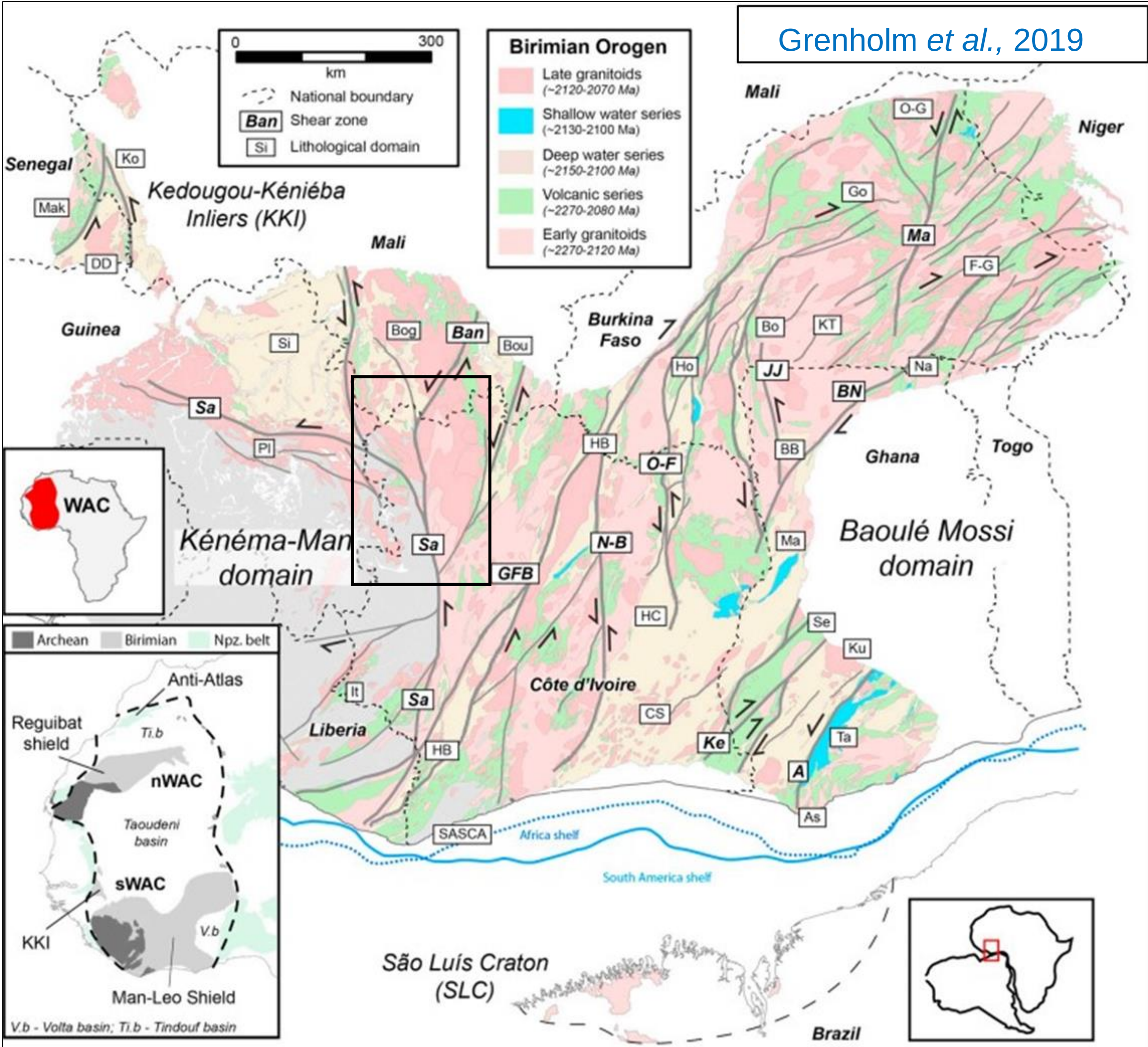
Significance of the Sassandra shear zone at the transition between the Archean Kenema-Man nucleus and the Paleoproterozoic Baoulé-Mossi domain (Côte d'Ivoire)

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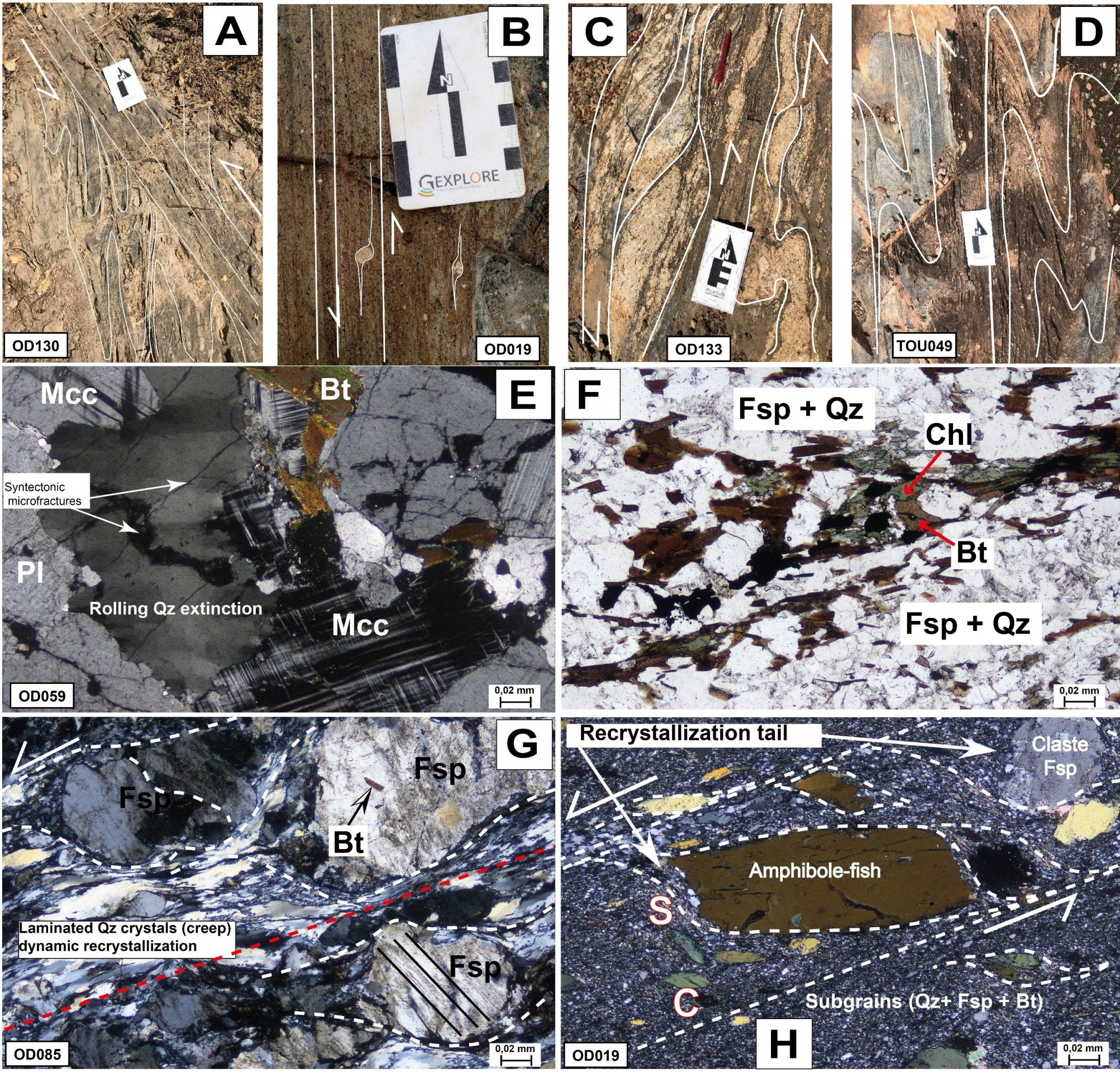
1. Geological context : the Sassandra Shear Zone in the West Africa Craton



(Fig. 1) The geological map of the West African Craton (WAC).

2. Lithological units and geochronological data of the Sassandra Shear Zone (SSZ)

The SSZ corridor is characterized by a mylonitic foliation transposing the metavolcanosedimentary series of the Baoulé Mossi Domain and a variety of amphibolites, paragneiss and orthogneisses (Fig.1 and 3B) that contain zircon grains with inherited U-Pb ages ranging from 3.37 to 2.5 Ga pointing to the contribution of Archean material (what about Paleoproter ages?) (Fig.3). The activity of the SSZ is also marked by the emplacement of syntectonic granitoids (Fig.2A-D). Plutonic rocks contain zircon with cores that yield an U-Pb age of 2095 Ma surrounded by a metamorphic rim dated at 2030 Ma, which is corroborated by an U-Pb age obtained on monazite from a paragneiss. These ages indicate an activity of about 65 Ma for the SSZ.



-Photo A shows a garnet mica schist affected by NE-SW axial folding, and photo B shows an orthogneiss (Fig. 2B and 2H) transposed by N-S sinistral shearing (mylonitic foliation) of the SSZ. This mylonitic foliation is characterized by the presence of feldspar porphyroclasts macroscopically (Fig. B) ;

-Photo C shows a paragneiss affected by a synmylonitic foliation characterized by the asymmetric boudinage of quartz-feldspathic leucosomes and asymmetric folds in N-S sinistral shear zones ;

-Photo D shows folds with a N-S trending subvertical axial plane ;

-Photo E at H : Microscopy reveals the presence of biotite, quartz, microcline, plagioclase, amphibole, and chlorite. The quartz crystals exhibit deformation bands (subgrains), and amphibole porphyroclasts (Figs. G and H).

Fig. 2: Lithology of the SSZ corridor.

3. Structural data

The Sassandra Shear Zone (SSZ) extends over 600 km in the west of Côte d'Ivoire and splits into two branches oriented N-S and NW-SE in the northwest of Côte d'Ivoire (Séguéla-Odienné) (Fig. 3A). U-Pb dating of monazites from a sillimanite paragneiss affected by mylonitic foliation dates the peak of SSZ metamorphism to approximately 2057 ± 13 Ma (Fig. 3B).

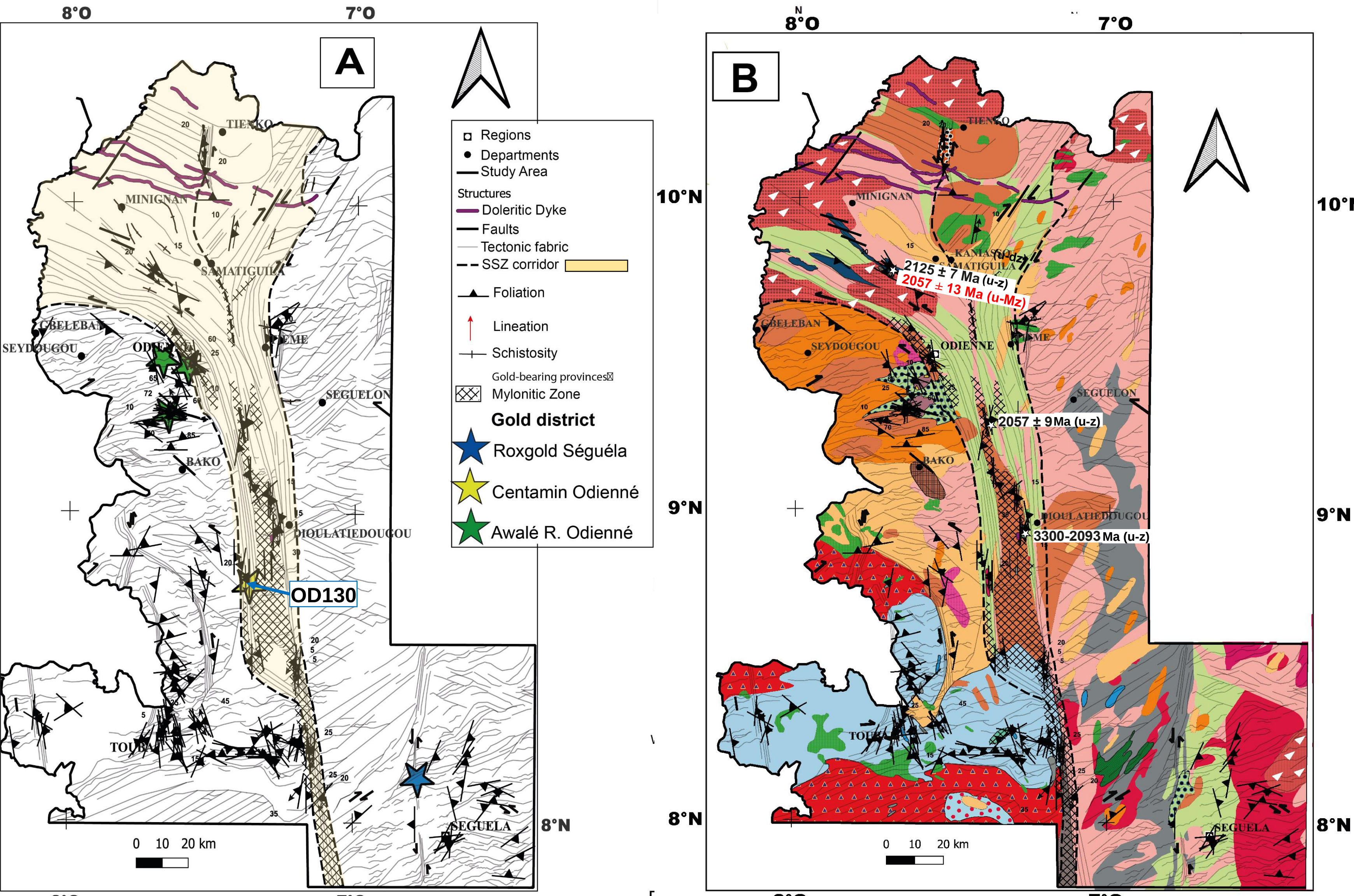


Fig. 3: Structural data (A) and geological map (B) of the southern sector of the SSZ; u (U-Pb), z (zircon), dz (detrital zircon) and Mz (monazite age)

4. PT condition of the Sassandra Shear Zone (SSZ)

A garnet mica schist from the core of the SSZ (Fig. 3) contains g, q, bi, pl and mu. SEM images and garnet profiles show a core rich in spe and rims rich in alm (Fig. 4a-c). Garnet displays growth zoning (Fig. 4) which points to a slight prograde evolution up to ~8 kbar, 580°C followed by decompression to 7 kbar, 590°C (Fig. 5). The metamorphism is of the Barrovian type, collisional tectonics with crustal thickening, characterized by apparent thermal gradients of 20°C/km and 40°C/km (Miyashiro, 1961; Allibone et al., 2002).

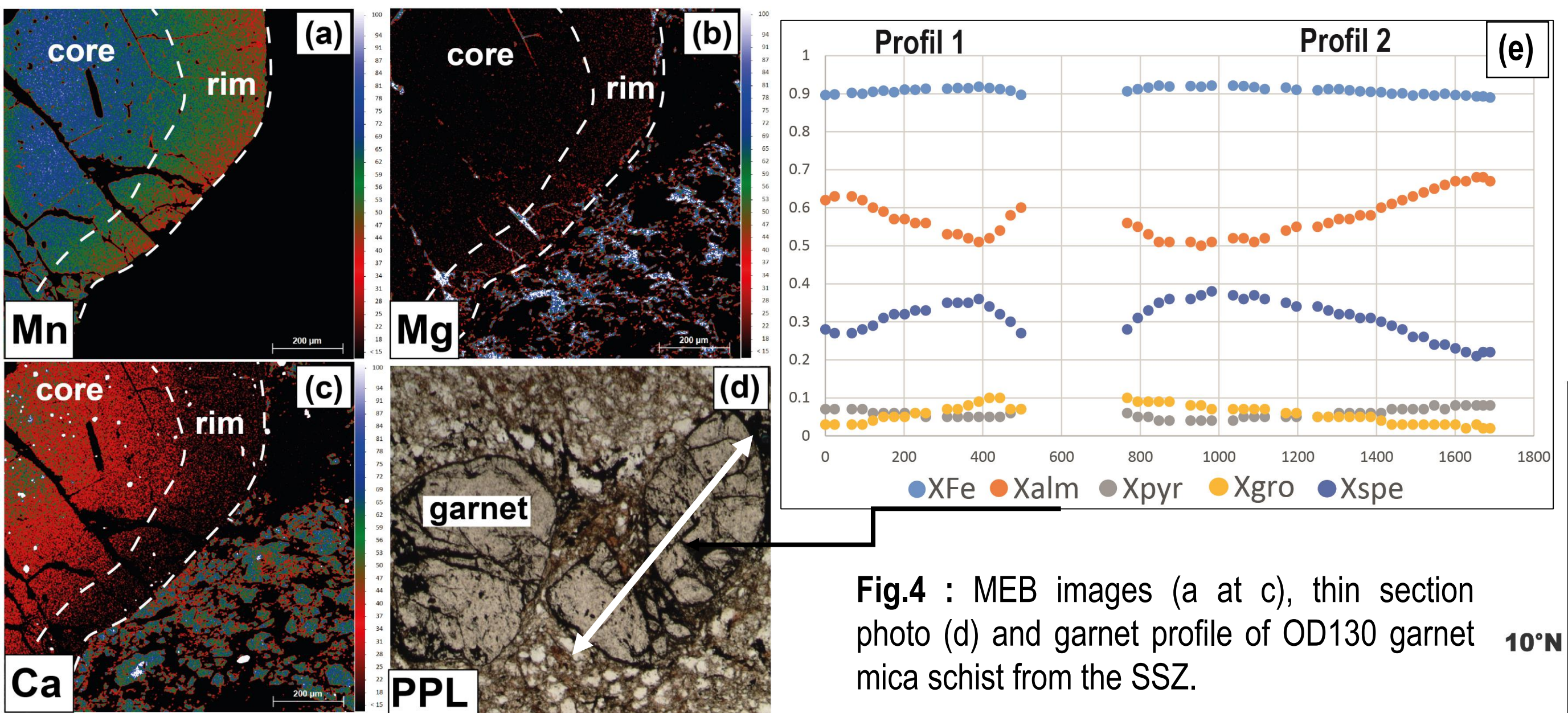


Fig.4 : MEB images (a at c), thin section photo (d) and garnet profile of OD130 garnet mica schist from the SSZ.

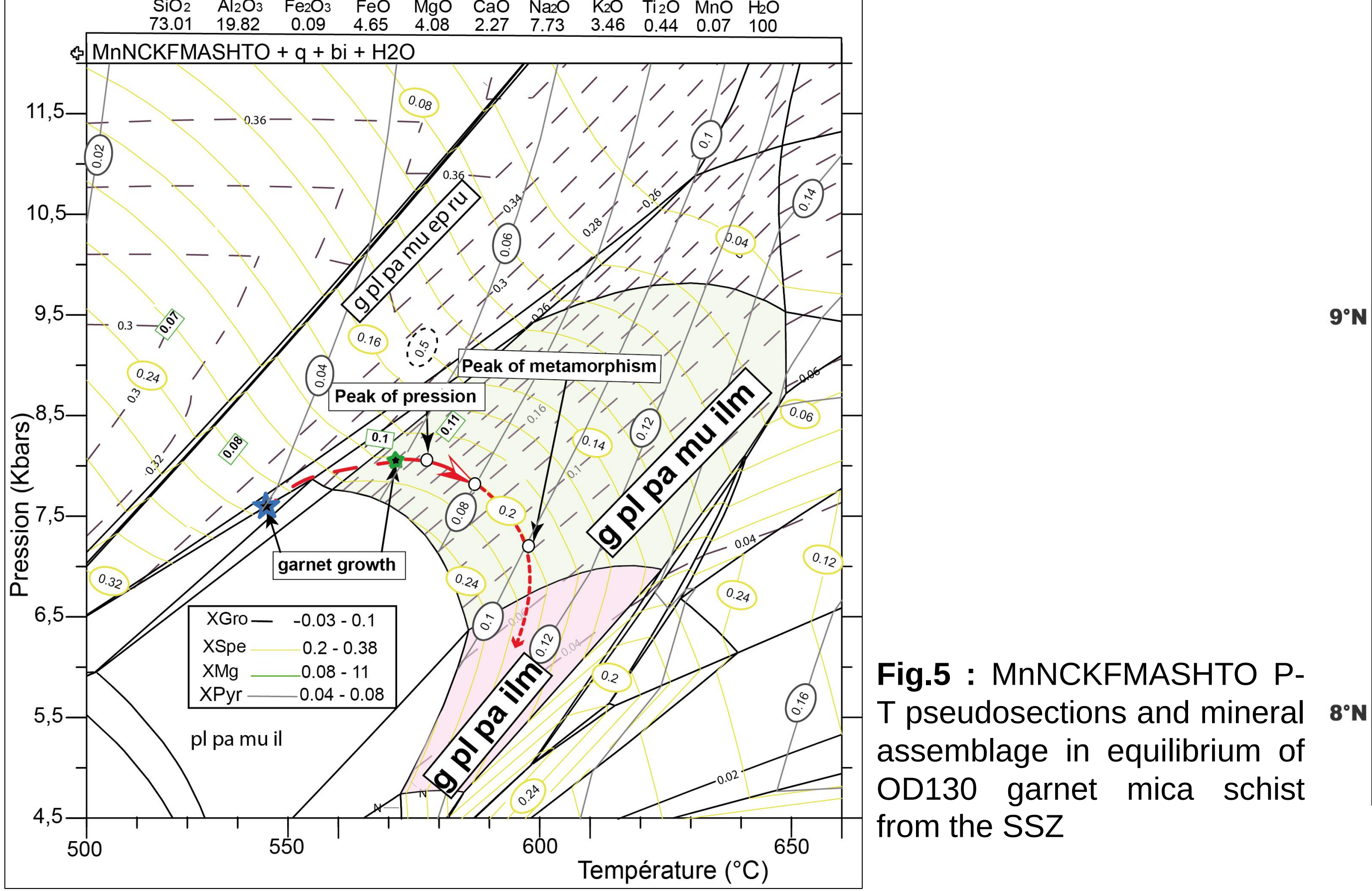


Fig.5 : MnNCKFMASHTO P-T pseudosections and mineral assemblage in equilibrium of OD130 garnet mica schist from the SSZ

5. Conclusion

The kinematic (sinistral) terrain fabrics are consistent with those of the microstructures which show that the lithologies of the SSZ corridor are affected by a sinistral shear oriented N-S to NW-SE in the Northwest of the Côte d'Ivoire. This study shows that the Sassandra Shear Zone (SSZ) can be considered a suture between the Archean nucleus and the Paleoproterozoic domain in its southern part (Fig. 3), and a shear corridor affecting the partially melted Paleoproterozoic crust in part around Touba and Seydougou (Fig. 3).

Structural Geology in a Changing World:
Tectonics, Resources and Sustainable Transitions

