KINEMATIC AND STRAIN ANALYSIS OF DEFORMATION OF THE PELAGONIAN NAPPE IN THE SOUTHERN VERMIO MT (NORTHERN GREECE)

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ABSTRACT

Preliminary results of the studied deformation, observed in the rocks forming the Pelagonian nappe (Mountrakis, 1983; Kilias, 1989) in the southern Vermio Mt, are presented here. This study is a by-product of a geological mapping project carried out in the scale of 1:25000 (Ouzounis, Kilias & Mountrakis, 2002). The studied area (Figure 1a) is part of the Kataphygion granodiorite (302±5 m.y. Yarwood & Aftalion, 1976) which was first mapped by Godfriaux (1968). The rocks encountered in the region were deformed in a tectonic episode dated at the lower Cretaceous (Yarwood & Dixon, 1977) under albite-epidote-amphibolite metamorphic facies (Mposkos & Peraki, 2001).

Orientated rock samples were taken from the field and microstructural observations were made on the XZ plane of the finite strain ellipsoid perpendicular to the foliation and parallel to the stretching lineaton. The schistosity plane is parallel to the XY plane of the finite strain ellipsoid. Kinematic analysis was carried out by examining shear sense indicators like S/C and ecc structures, σ and δ porhyroblasts and porhyroclasts, shear bands and mica fish (Paschier and Trouw, 1996) on the micro and mesoscale. In order to calculate strain the Rf/φ (Dunnet, 1969) and Rf/θ method (Peach & Lisle, 1979) was applied on feldspar porphyroclasts of the Kastania granodiorite. The Fry (Fry, 1979) method was applied on the xz plane of microscopic quartz aggregates within the mica-schist inorder to identify the shear of sense.

The fieldwork conducted in the study area revealed a tectonic stacking of different lithological sequences which all show a penetrative schistosity striking mainly NW-SE and dipping NE or SW due to folding in the megascale. On the schistosity plane a stretching lineation is visible dipping NE or SW, depending on the plane dip direction. The mylonitic fabric is traced parallel to the main schitosity observed in the region.

The rocks forming the Pelagonian nappe in our study area are grouped as follows (section A-A'-Figure 1a):

The uppermost sequence forms a recrystallized carbonate sheet of Triassic-Jurassic age which is underlain by an Upper Palaeozoic (?) schist-gneissic horizon of approximately 50m. Both are lain through a tectonic contact on a lower body of marbles with a thickness of approximately 200-300m. It is generally believed that this marble body is of presumably the same age as the upper carbonate sheet. Additional geological observations though, give some evidence that these two horizons may have a different tectonic history. These rocks are underlain from top to bottom by:

I. Palaeozoic (?) metapelitic rocks intercalated with amphibolites. Within the metapelitic rocks a characteristic mica schist horizon with syntectonic aggregates of garnet locally up to 0.5 cm in size can be found. Also σ-and δ-porphyroclasts of quartz and feldspars are a common feature. These porphyroclasts and porphyroblasts indicate a top to the SW sense of shear. Further examination in the metepelite revealed S/C structures also indicating towards SW sense of shear. Fry analysis on quarz grains deformed within the metapelite revealed a top to SW sense of shear.

II. an Upper Carboniferous intensively sheared granodiorite showing a top to SW sense of shear, too. The Rf/φ and Rf/θ method was applied on feldspar porphyroclasts on the XZ and YZ plane of macroscopic samples. The Rs strain value of the finite strain ellipsoid ranges from 1,824-2,575. By examining the evolution of the finite strain ellipsoid along the section A-A' (figure 1a) it is obvious that strain increases with depth in the granodiorite. The K factor attained ranges from K=0,47-0,55. Projection of the attained parameters on the Flinn diagram (Figure 1b) indicates a flatterinf type for the finite strain ellipsoid.

III. a complicated, extremely sheared, crystalline sequence of amphibolitic, metasedimentary and metaigneous rocks along the Lefkopetra-Mikra Santa road. Mylonitic rocks are observed within

this tectonically lowermost situated sequence. Kinematic criteria indicate a movement top to the SW.

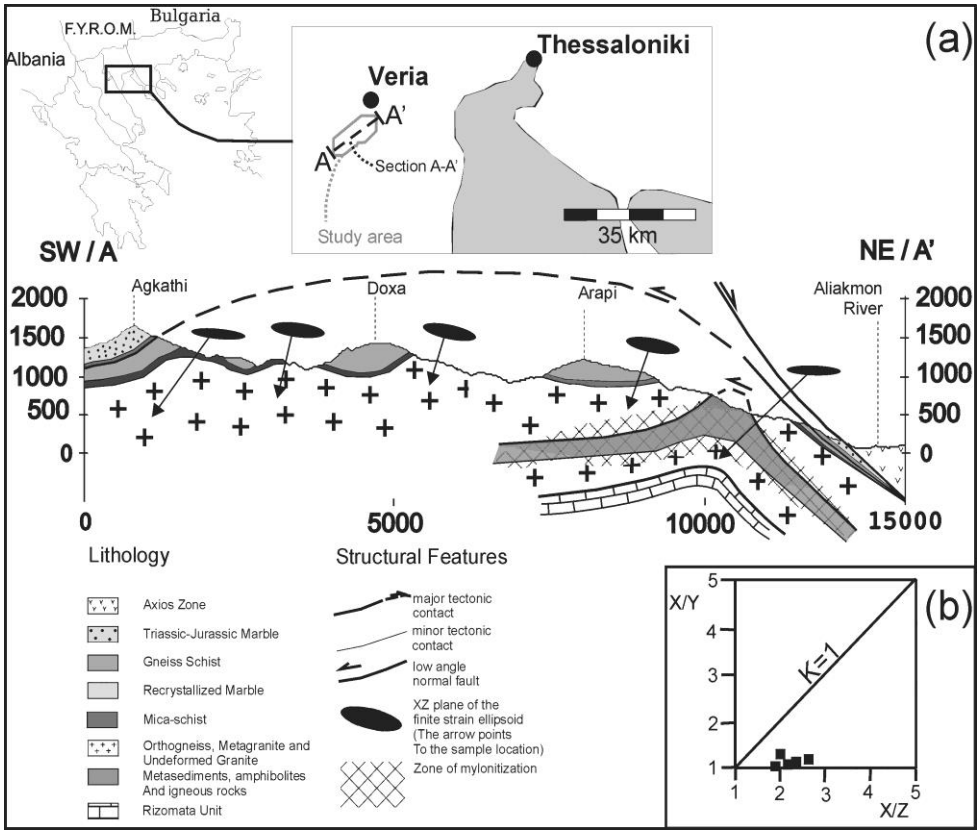

Figure 1. (a) The location of the study area and the geological section A-A'.
(b) Flinn diagram from measurements of the K factor along the section A-A'.

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