



## **Microstructural characteristics of cataclastic rocks in the Bolu Metamorphites from Bolu Massif, Northwest Turkey**

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In this study, the mineralogical, petrographical and microstructural characteristics of rocks, outcropped in Bolu Massif which is located in the West Pontides, are studied. These metamorphic rocks are known as Bolu Metamorphites. The Bolu Metamorphites contain two main subunits, known as Lower and Upper Metamorphites. The Lower Metamorphites include amphibolites and amphibole-gneiss, metadiorite and metagranite. The Upper Metamorphites unconformably overly the Lower Metamorphites and consists mostly of quartzites, metasandstone, phyllite and recrystallized limestone. The cover units (Cretaceous-Tertiary age and Quaternary age deposits) in the studied area form the sedimentary rocks such as conglomerate, sandstone, siltstone, claystone, limestone, fossiliferous limestone and lie unconformably on to the Bolu Metamorphites. The Quaternary deposits are made up of debris deposits, alluvium and travertine. In addition, vein rocks such as aplite, quartz microdiiorite, andesitic and basaltic dikes with small size have been determined mostly within and sometimes as cutting the Lower Metamorphites and these vein rocks were probably settled during the magmatic activity.

In study area, petrographical studies showed that the level of the first dynamothermal metamorphism is in the upper amphibolite facies levels (M1) and this facies formed the Lower Metamorphites. Later following up the greenschist facies metamorphism (retrograde metamorphism; M2) developed and hence the Upper Metamorphites formed. This metamorphism also affected to the Lower Metamorphites at the same time. Finally cataclastic metamorphism (M3) affected the studied area in the

Upper Miocene (Neogene Period).

As a result of cataclastic metamorphism, (M3) cataclazite and microbreccia occurred which indicates brittle deformation, also prothomylonite, mylonite and ultramylonitic rocks occurred showing ductile deformation. In this study the cataclastic zone map of the study area has been also constructed.

Analysis of cataclastic rocks in the studied area show different asymmetric microstructural features that give various clues about the deformational features, like asymmetric pressure shadows, displaced broken grains, elongated quartz fabric.