

kilometers long. Numerous intensive tectonic movements made space for the circulation of hydrothermal solutions which deposited not only galena, sphalerite, pyrite and gold but gem minerals as well. Precious silica minerals are represented by amethyst, amethyst-agate, and agate. Red jasper appears only in small quantities. Amethyst is characterized by a fine dark purple colour. Chalcedonic agate is represented by concentric bands of grey, bluish, brown, purple and red chalcedony.

Bučumet deposit. In the succession of andesite lava flows and pyroclastic material, silica masses formed as plate-like ore bodies. These masses are result of depositing silica around thermal springs and geysers. This type of deposit is known as siliceous sinters or geysers and represents second type of primary gem deposits in this volcanic complex. Siliceous mass, represented by fibrous chalcedony, granular quartz and relict opal, has very heterogeneous colour varieties. Basically, a very wide range of colours appears in short range. Chalcedony is represented by dominantly mixed and uniform colour varieties of white, bluish, gray, brown, red and black colour. Jasper is yellowish-brown to reddish-brown. Vrtače and Kameno rebro deposits. These deposits belong to the group of secondary deposits – placer type deposits. While Vrtače is an eluvial deposit in pyroclastic material with partially preserved primary ore body, Kameno rebro is a completely delluvial deposit formed beyond the volcanic complex in the surrounding Proterozoic metamorphic complex. Gem minerals which occur in these two deposits are of the same type as in the Bučumet. It is assumed that the material in the deposit of Kameno rebro mostly originates from the eroded part of Bučumet deposit.

Apart from the above mentioned deposits with defined reserves, there are also numerous insufficiently explored occurrences, mostly placer ones (eluvial, delluvial, proluvial and alluvial). These occurrences are mostly concentrated out of the volcanic complex, i.e. on its eastern rim.

Geomorphological characteristics of Kratovo-Zletovo palaeovolcanic area

Milevski I.

Institute of Geography, Faculty of Natural Sciences and Mathematics, University "Ss. Cyril and Methodius", Skopje, F.Y.R. Macedonia, ivica@pmf.ukim.edu.mk

Kratovo-Zletovo palaeovolcanic area is known as one of the largest in the F.Y.R. Macedonia and wider, covering a total of 970.1 km². A huge amount of pyroclastic material is expelled here, with an average depth of about 700 m. According to Serafimovski, Arsovski etc., volcanic activity in Kratovo-Zletovo area started at the end of Eocene or lower Oligocene, and with some pauses last up to lower Pliocene. In that period, volcanic activity successively moved from north-east to south-west, with changes in volcanic intensity (violent eruption followed by expel of pyroclastic material; with silent phases followed by lava flows). The volcanism in the region was generally caused by deep sub-meridional dislocations, activated by Paleogene east-west extension. To the end of Miocene, volcanic activity is reestablished by longitudinal neotectonic dislocations, started with younger north-south extension. Geomorphologically, in Kratovo-Zletovo area there are about 20 volcanic cones and calderas, highly eroded by post-volcanic fluvial-denudation processes. Only Plavitsa cone (1297 m) and Lesnovo cone (1167 m) are better preserved, as well as their calderas on the top. These two volcanic centers, together with Uvo-Bukovets cones, Zdravchi Kamen, Zhivalevo and other volcanic necks, belongs to the older volcanic phases, while younger centers are located in the south and west part of palaeovolcanic area (Crni Vrv (1115 m), Preslap (1117 m) and Rajcani (867 m) cones with some remnants of calderas). After finishing of the volcanic activity, due to strong erosion, volcanic forms subdue significant morphologic modifications. Today, on the remnants of palaeovolcanic cones, there are many fluvial, denudation landforms and even fossil coastal terraces. For that reason, the recent nature of Kratovo-Zletovo palaeovolcanic landscape is polygenetic.