Mineral Occurences of the Eastern Greater Caucasus, Georgia

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Introduction

The eastern part of the Greater Caucasus orogen, termed the Georgian segment, is mainly underlain by highly deformed Lower-Middle Jurassic shales, sandstones, and volcaniclastic rocks, and is cut by numerous intrusive bodies of various composition and sizes. All these rocks experienced hydrothermal alteration and mineralization processes. At some hydrothermally altered areas mainly copper-pyrrhotitic and pyrite-polymetallic ores were formed. Already known mineral occurrences were studied and, at the same time, new and interesting occurrences were discovered in hydrothermally altered zone in the r. Stori canyon (Bendena, Gelia) and pyrite-polymetallic mineralization at the village Lechuri. The Lechuri occurrance should be of great interest, since it shows lots of similarities to Filizchay pyrite-polymetallic deposit by its geologic position and mineralogical-geological parameters. At some areas increased concentrations of Au (Artana and Tebulo mineralized areas) were reported.

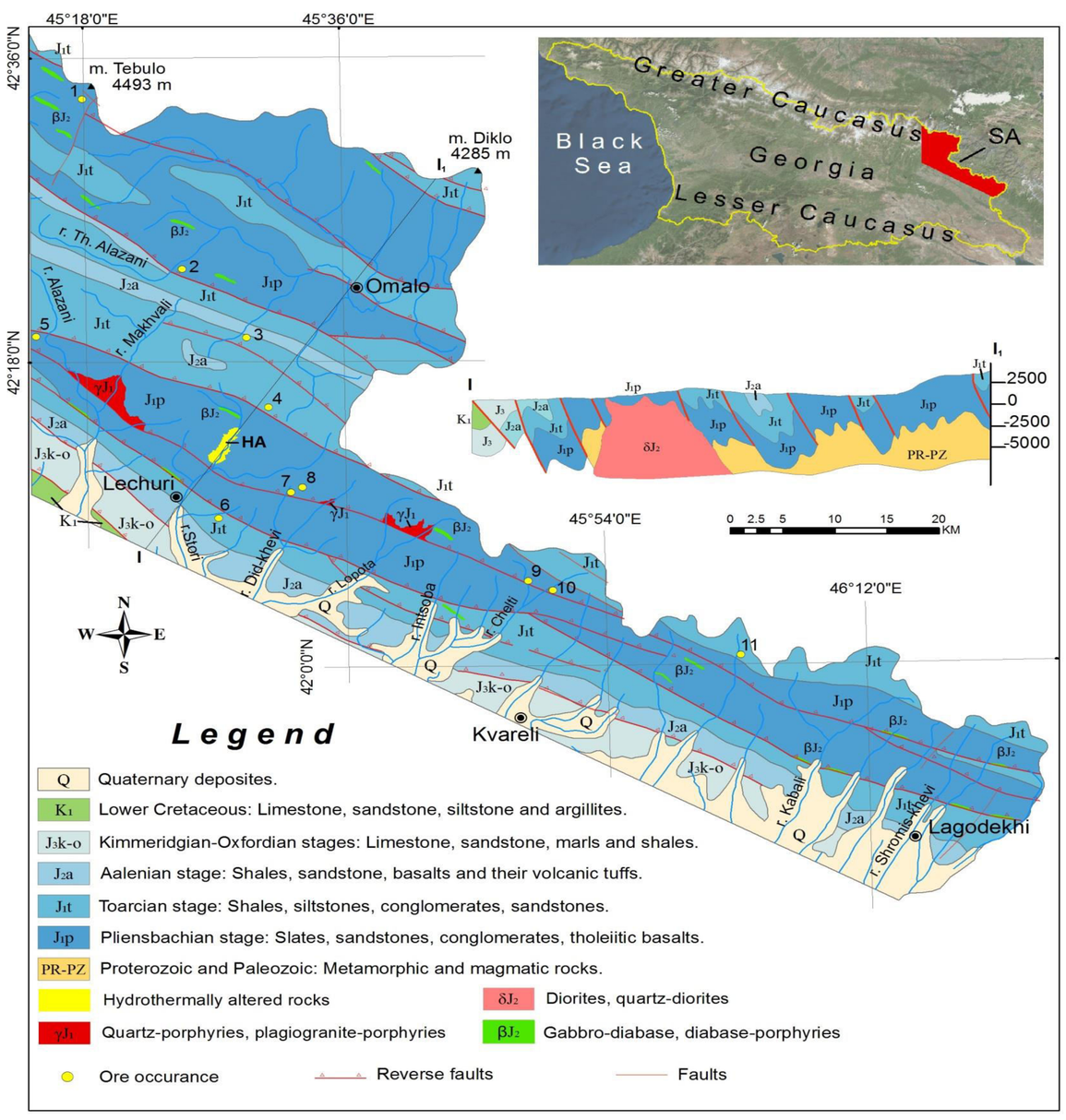

Fig.1. *Geological Map of the Eastern Greater Caucasus Georgian Segment main mineral occurrences: 1-Tebulo, 2- Ilurta, 3-Satskhvre Khorkhi, 4-Abano, 5- Quachadala, 6-Lechuri; Artana orefield: 7- Samchedlo, 8-Englisuri, 9- Loduani, 10- Chelti and 11-Shorokhevi. HA - Stori hydrothermal alteration zone.*

More than 100 quartz-pyrite-pyrrhotite and copper-polymetallic ore manifestations of different scale are detected in the eastern Greater Caucasus Georgian segment, which are represented by impregnations, lodes, veins and massive sulphide bodies.

Methods and Materials

During the geological field work more than 200 samples were collected for petrographic study, about 700 samples – for geochemical analyses. In addition 12 samples of magmatic rocks were selected for isotopic (U-Pb method) dating. Geochemical analyses for many metals were conducted at AcmeLab Vancouver laboratory, Canada, using ICP-MS methods, and also at the laboratory of CMG Gold Ltd by the atomic absorption spectrometry.

Geological Settings

The Caucasus represents a Phanerozoic orogen that formed between the southern continental margin of the Eurasian and the Arabian plates, and it extends for more than 1200 km from the Caspian to the Black Sea (fig.2).

The eastern Greater Caucasus in Georgia, which is approximately 25-40 km in width, can be traced for about 125 km, from the Iori-Alazani watershed in the east to the Mazim-Chay River valley near the Azerbaijan border (fig.1, 2). Its northern border runs along the boundaries of Dagestan and Chechnya, and to the south is separated from the Alazani River depression by a regional fault system. The entire area covers approximately 3900 km^2. On the southern slope

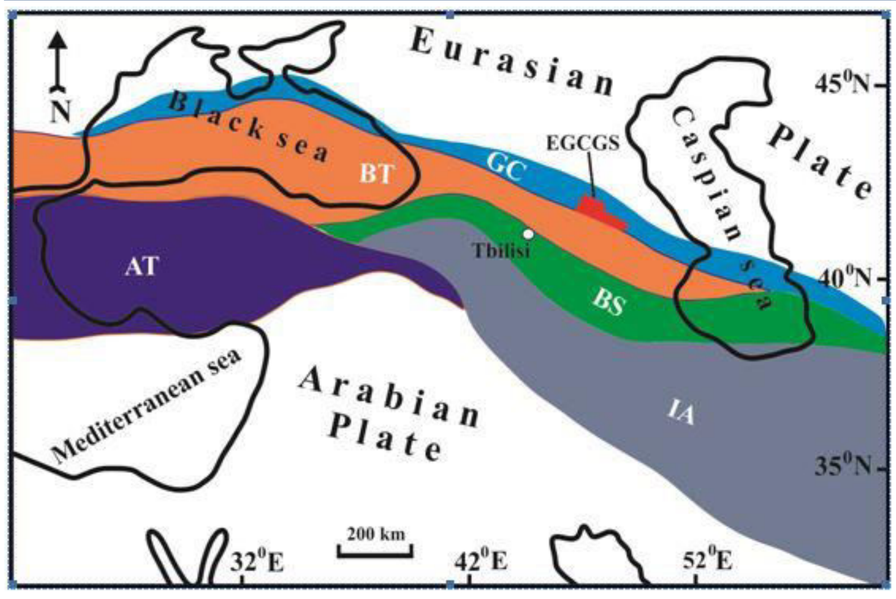

Fig.2. Tectonic zoning of the Caucasus and adjacent area on the basis of the terrane analysis Adapted after I. Gamkrelidze (1997).

Terranes:
GC- Greater Caucasian,
BT- Black Sea-Central Transcaucasian,
BS-Beiburt-Sevanian,
IA – Iran-Afganian,
AT –Anatolian.
EGCGS-
Eastern Greater Caucasus Georgian Segment

of the Greater Caucasus, our study area is delineated by the Alazani River and its tributaries. On the northern slope, the area is defined by the Tusheti Alazani River and its tributaries in the Tusheti region (fig.1, 2). The sedimentary cover of both slopes is mainly represented by highly folded Lower-Middle Jurassic schists, shales and sandstones, and dacite-andesite-basalt volcanic formations. All rocks have experienced extensive faulting, brecciation, hydrothermal alteration and metallic mineral deposition (Okrostsvaridze et al. 2011).

Mineral Occurrences

Different scale copper-pyrrhotite and pyrite-polymetallic mineral occurrences, forming impregnations, lodes, veinlets or massive mineralized bodies are met. Mineral occurences of Tebulo, Ilurta, Satskhvre Khorkhi, Abano, Quachadala, Artana, Loduani, Chelti, Shorokhevi and Areshi were studied, and some - were observed and studied for the first time, in the hydrothermally altered zone of the r. Stori (Gelia, Bendena and zone enriched with Th) (fig.3) and at the

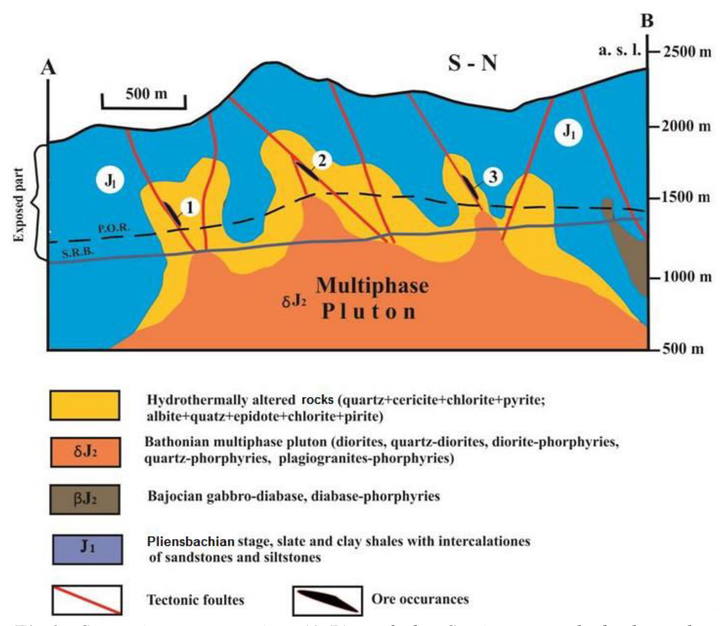

Fig.3. *Scematic cross section (A-B) of the Stori canyon hydrothermal alteration zone. Mineral occurrences: 1- Bendena, 2- Gelia, 3-Thorium (P.O.R –Pshaveli-Omalo road; S.R.B –Stori River Bed).*

Considering the results of the study, Tebulo and Stori areas and Lechuri polymetallic mineral occurrence are of particular interest. Metal concentration of Lechuri ore varies: Au – 0.02-0.08 g/t, Ag – 5-16g/t, As – 40-92 g/t, Bi – 7-28 g/t, Cu – 300-1470 g/t, Pb> 10000 g/t. At Tebulo -80 ppb Au, 5 ppm Ag, 292 ppm As, 9 ppm Bi, 9 ppm Cd, 7 ppm Co, 696 ppm Cu, 9010 ppm Pb, and Zn>1%.

Fig. 4. *Gelia quartz-sulphide ore lode, Story River-gorge.*

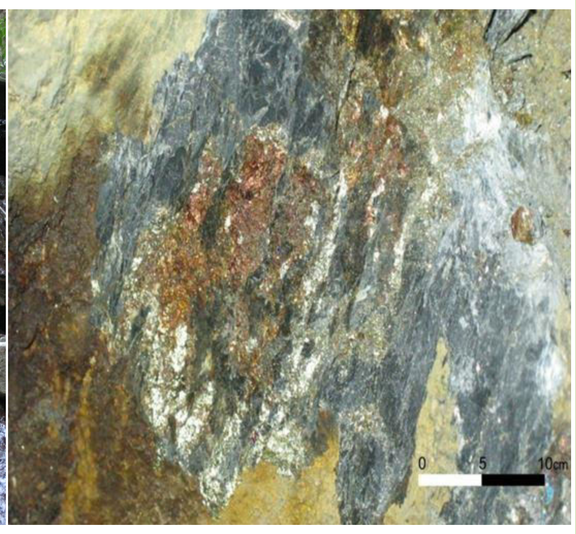

Fig. 5. *Orebearing quartz-pyrrhotite-chalcopyrite veinlets in selvage of vein " Englisuri ".*

Results

Numerous mineral occurrences in the Eastern Greater Caucasus Georgian segment were formed from similar magmatic-hydrothermal fluids, but under different temperature regimes. There is no doubt that Artana, loduani, Chelti, and other similar mineral occurrences are small-scale when compared to many developed world-class metal deposits. However, the Stori and Tebulo districts have potential to develop large-scale resources, as supported by the extensive development of quartz-sericite-chlorite-pyrite and albite-epidote-chlorite-pyrite alteration zones.

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