Geophysical Research Abstracts
Vol. 20, EGU2018-660, 2018
EGU General Assembly 2018

Insights to Jurassic-Cretaceous Tethyan subduction dynamics along the Southern Eurasian Margin: deformation and timing of magmatism across the Somkheto-Karabagh Mountain Belt, Lesser Caucasus, Armenia and Georgia

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The southern Eurasian margin in the Lesser Caucasus is marked by the Somkheto-Karabagh Mountain Belt. Bordering it to the South, ophiolites mark the limit between Eurasia and the Gondwanian derived South Armenian Block on which they have been thrusted. This belt consists of a volcanic arc formed along the Southern Eurasian margin during closure of the Tethyan oceanic domains. Arc construction lasted from at least the Mesozoic to the very beginning of Cenozoic times due to successive North-dipping Palaeotethys and Northern Neotethys subduction until collision between the Eurasian and the South Armenian Blocks. Formation of the present day Somkheto-Karabagh can be assigned to two stages: (1) Mesozoic arc construction and evolution along the Eurasian margin, and (2) Cenozoic magmatism and collisional to post-collisional tectonics controlled by inherited structures acquired prior to and during the course of Late Cretaceous-Paleogene accretion along the Eurasian margin.

Investigations of the Bolnisi mining district in Georgia and the Alaverdi mining district in Armenia along a N-S section across the arc have revealed structures indicative of successive compressional and extensional phases throughout Mesozoic times. New insight concerning the structural evolution of this portion of the Somkheto-Karabagh is related to the nature and timing of the magmatic activity associated with the ore deposits.

The Alaverdi district consists of stratabound polymetallic deposits hosted by Middle Jurassic volcanic rocks, and the Teghout porphyry Cu deposit, postdating the emplacement of a tonalite reported as Late Jurassic. The Bolnisi district includes essentially epithermal systems, and possibly one transitional system interpreted in earlier studies as VMS-porphyry-epithermal emplaced within Late Cretaceous formations. These latter are the last metallogenic events associated with subduction of the northern branch of the Neotethys before accretion of the South Armenian block with the Eurasian margin during the latest Cretaceous (Early Maastrichtian, ~73-71 Ma).

LA-ICP-MS U-Pb dating has allowed the revision of the temporal constraints, including the succession of magmatic events in the study area. The structural context is correlated to the magmatic suites. Their mineralogy, major and trace element geochemistry and isotopic characteristics are used to deduce their source including formation environment and conditions. A detailed depiction of the evolution of the tectonic setting as well as subsequent variations in subduction dynamics from Paleotethyan subduction to collision is proposed.