

## **Evidence of shallow-marine depositional environment of the host rocks of the Madneuli polymetallic deposit, Bolnisi district, Georgia**

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The Madneuli copper-gold polymetallic deposit is the major ore deposit of the Georgian Bolnisi mining district in the Artvin-Bolnisi belt in the southeastern part of Georgia, Lesser Caucasus. Numerous ore deposits occur in the Bolnisi region connected with Upper Cretaceous explosive volcanic events. Our study, based on physical volcanology and sedimentary basin analysis is the first detailed approach for the host rocks of the Madneuli deposit, which still need to be carried out in future investigations in similar environments along the Lesser Caucasus and the Eastern Pontides, where the submarine or subaerial depositional environment of rock units is still very much debated or poorly constrained.

The host rocks of the Madneuli deposit consist predominantly of lava, pyroclastic, volcanogenic-sedimentary and sedimentary rocks of rhyodacitic composition, which are grouped in two facies assemblages: volcanic and volcano-sedimentary (Popkhadze 2014; Popkhadze et al. 2014). The thickness of volcano-sedimentary facies assemblages is about 200m and predominantly occurs in the open pit.

The association in the volcano-sedimentary complex, where bedding textures are consistent with deposition with turbiditic currents, with the presence of slumps, cross-bedding, load casts, groove marks, wave and current ripples, different bioturbations and radiolaria-bearing horizons support a submarine depositional environment for the bedded volcano-sedimentary rocks in the Madneuli open pit. Hyaloclastite records the interaction of magma emplaced in unconsolidated volcano-sedimentary rocks associated with a submarine rhyodacite dome, emplaced during several pulses (e.g. Gibson et al. 1998). The presence of chilled juvenile clasts, the angular, blocky, moderately vesicular volcanic glass shards attest to the sudden chilling, as well as the high confining pressure during the magma-water interaction (Nemeth and Martin 1999) during the phreatomagmatic explosion in the Bolnisi region. This is also documented by the presence of phreatomagmatic breccias in the open pit.