

# SEG 2022 Conference: Minerals For Our Future

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## Exploration Search Space Constraints for Copper-Gold Host Rocks in the Timok Magmatic Complex

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The Upper Cretaceous Timok Magmatic Complex hosts some of the largest copper-gold resources in the Western Tethyan orogenic collage. However, the timing relationships between mineralization episodes and host volcanic packages are not well constrained. The Timok volcanic, sub-volcanic and volcanoclastic rocks range from basalt to trachyte compositions and are dominantly medium- to high-K calc-alkaline. Mafic- to intermediate volcanic rock suites can be difficult to tell apart in the field but are distinguished using Zr/Ti and Nb/Y plots. Importantly, volcanic facies and composition changes correspond to discrete timing breaks within the stratigraphic sequence. We have characterized key volcanic rock suites from the central and southwest Timok and have constrained their ages using LA-ICP MS (U-Pb zircon).

Data compilation of regional U-Pb zircon grain ages indicate that Timok arc activity began at ~92 Ma with emplacement of an 80 km long by >20 km wide zone of arc magmatism (present coordinates after shortening). Reported major magmatic ages (U-Pb) for the Eastern Timok are ~90 Ma, ~85 Ma and ~82 Ma, and the Re-Os ages are ~88 to ~86 Ma. Our data indicate that the Central Timok volcanoclastic basalt is  $78 \pm 3$  Ma or younger, and the Central Timok volcanoclastic andesite is  $79 \pm 3$  Ma or younger (interpreted maximum ages; LA-ICP MS). We have also detected a mineralized porphyry intrusive in the southwest Timok with an age of  $70 \pm 1$  Ma (LA-ICP MS; zircon).

Our geochronology and map constraints indicate that 1) volumetrically, most of the Timok stratigraphy at the current erosion level is younger than ~78 Ma and may overlie important host rocks which are only exposed on the Timok margins, and 2) despite the lack of major copper discoveries in <78 Ma host rocks, the Timok continued to yield porphyry-style footprints after ~70 Ma.