Re-Os and Tectonics – Chronology, Concentrations, and Commodities in the South Carpathians and Balkans

A. ZIMMERMAN[1], H. STEIN[1,2], J. HANNAH[1], D. KOZELJ[3], T. BERZA[4]

[1] AIRIE Program, Department of Geosciences, Colorado State University; aaron.zimmerman@colostate.edu
[2] Geological Survey of Norway, 7491 Trondheim, Norway
[3] Copper Institute, Zeleni Bulevar 35, 19219 Bor, Serbia
[4] Geological Institute of Romania, Caransebes Str. 1, Bucharest, RO-012271 , Romania

The Apuseni-Banat-Timok-Srednogorie (ABTS) Belt of southeast Europe, with its porphyry, skarn, and epithermal base and precious metal deposits, provides a unique location to use Re-Os data from molybdenites to link metallogenetic type with evolving convergent tectonic patterns. Re-Os chronology and Re concentrations (typically hundreds to thousands of ppm) suggest that Cu-dominant porphyry-style deposits with high Au-PGE are associated with early subduction, whereas younger deposits dominated by base metals and lower Re concentrations (tens of ppm) have a source with increasing crustal involvement (Stein et al. 2001; Stein 2006). Fluid-fluxing and partial melting of undepleted mantle seems a necessity for Au-PGE enriched porphyry-style deposits.

Fifty-one Re-Os analyses track a punctuated temporal development of deposits from the southeasternmost Panagyurishte (92-87 Ma, Srednogorie Zone, Bulgaria), through Timok (88-81 Ma, Serbia), to the northwesternmost Apuseni-Banat (82-72 Ma, Romania) region. Within districts, however, age zonation may be parallel (Apuseni-Banat) or perpendicular (Timok, Panagyurishte) to the strike of paleosubduction. For example, in Panagyurishte, resolvable periods of mineralization, decrease systematically from north to south over 5 m.y. Likewise, in Timok, deposit ages decrease from east to west over 7 m.y. At the deposit scale, where ore paragenesis is well documented, mineralization occurs in <1 m.y. (and commonly <500,000 years).

Re-Os ages and concentration data coupled with deposit type suggest a convergent tectonic setting where subducted oceanic slab steepens with time (slab rollback) thereby inducing relaxation of the upper plate in response to transient (short-lived) tectonic reconfiguration(s). Enhanced rollback leading to back-arc spreading (extension) may account for migration of mineralization perpendicular to the trench. Limited rollback and orogen-bounding normal faults may explain trench-parallel age progression.

References

[1] Stein H.J. (2006) *Lithos* **87,** 300-327.
[2] Stein H.J., Markey, R.J., Morgan, J.W. and Scherstén, A. (2001) *Terra Nova* **13,** 479-486.