Chemical composition of waters associated with porphyry copper deposits, Chukotka, Russia

T.N.LUBKOVA[1], D.A.YABLONSKAYA[1]*,
T.V.SHESTAKOVA[1] AND YU.N.NIKOLAEV[1]

[1]Department of Geochemistry, Faculty of Geology, Lomonosov Moscow State University, 119991, Moscow, Russia (*correspondence: daria.yablonskaya@gmail.com)

Acid drainage is regarded as the worst environmental problem related to exploration and mining of sulfide-hosted deposits that adversely affects water quality. Our studies have focused on major factors determining water chemistry at the Nakhodka porphyry copper ore field [1]. This area is located in the south of the Baimskaya ore zone, Northeastern Russia, where the largest copper resources are concentrated [2].

We have studied the chemical composition of springs and headwater streams associated with porphyry copper mineralization, receiving downstream waters (mixing zone) and streams draining unmineralized areas (fig. 1).

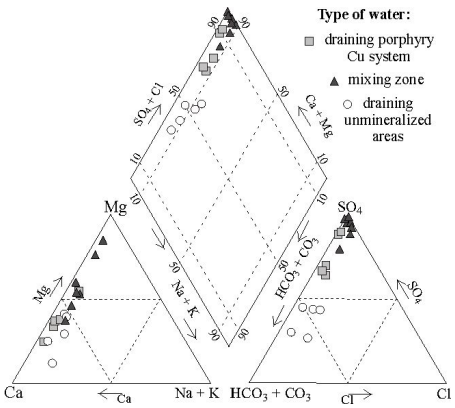

Figure 1: Water samples plotted on a Piper diagram

Waters draining porphyry Cu areas have pH values as low as 3.2, SO_4 up to 3740 mg/L and high metal concentrations: Cu up to 18.8 mg/L, Fe up to 8.9 mg/L, Zn up to 32.0 mg/L.

Acidic waters affect receiving streams resulting downstream changes in their composition. Compared to waters draining unmineralized areas SO_4 increased from 35 to 146 mg/L, salinity – from 96 to 215 mg/L. Due to dilution and neutralization pH decreased weakly from 7.3 to 5.9. Therefore these waters have low dissolved metal concentrations (for example, Cu, Fe, Zn up to 0.04 mg/L).

[1] Lubkova *et al* (2013) *Water: Chem. and Ecol.* **12**, 29–34.
[2] Chitalin *et al* (2013). *Miner. Res. of Russia*, **6**, 68–73.