The Pb-Zn deposit of Jalta, Northern Tunisia: A genetic model based on mineralogy, petrography, and metallic trace elements and isotope (S, C, O, Pb) geochemistries

N. JEMMALI[1]*, F. SOUISSI[1], T. VENNEMANN[2], J.E. SPANGENBERG[2], I.M. VILLA[3] AND K. BOGDANOV[4]

[1]Laboratory of Mineral Resources and Environment, Faculty of Sciences of Tunis, 2092 El Manar, Tunisia (*correspondence: nejib.jemmali@yahoo.fr)
[2]Stable Isotope Laboratory, Institute of Mineralogy and Geochemistry, University of Lausanne, Switzerland
[3]Isotope Geology, Institute of geology, University of Bern, Baltzerstrasse 3, 3012 Bern, Switzerland
[4]Sofia University, Department of Mineralogy, Petrology and Economic Geology, 15 Tsar Osvoboditel Bd. 1504 Sofia, Bulgaria

The Pb-Zn mine of Jalta (1902-1951), belongs to the Nappe Zone of Northern Tunisia. The mineralization, (galena, sphalerite and jordanite, associated to pyrite and barite), runs along the Triassic (dolostones)-Miocene (conglomerates) limit. The occurrence of mineralization as open space fillings (lodes and cement of tectonic breccias), gives evidence of the relation between the mineralizing process and tectonics. Anomalies in MTE in the Triassic rocks are pronounced in Pb, Zn, Cd, Co and Cr for carbonates and in Pb, Zn and Cd for clays. These anomalies are attributed to the hydrothermal alteration around fault conduits. Both, the barite δ^{34}S values (+12.2 to +16.2 ‰) and the C and O isotopes of carbonate host rocks are consistent with the derivation of sulfate and carbonates from Triassic seawater. The δ^{34}S values of galena and pyrite (-10 to +12.5 ‰), suggest that sulphur comes from the mixing of two distinct fluids: an acid, metal-rich and sulfur-poor hydrothermal fluid and a cool, oxidized, metal-poor and sulfur-rich modified seawater. Lead isotope average ratios for galena (18.788, 15.672, and 38.826 for ^{206}Pb/^{204}Pb, ^{207}Pb/^{204}Pb, and ^{208}Pb/^{204}Pb, respectively) are consistent with a well-mixed multi-source (upper crust and lower crust) reservoir. The deposition of the ore took place after the thrust sheets emplacement (Alpine orogeny) during the Late Miocene extensional phase to which basalt emplacement is associated north of Jalta (Nefza area).

Study of denitrification process in Ishikari river system, Japan

PAWAN KUMAR JHA* AND MINAGAWA MASAO

Graduate School of Environmental Science, Hokkaido University, Japan (masao.minagawa@gmail.com)
(*correspondence: findpawan@gmail.com)

In-stream denitrification process is permanent sink of dissolved nitrogen load thus helps in maintain the stream water quality and reducing the input into N-sensitive costal environment. The aim of present study is to determine spatial and temporal variability of sediment denitrification and associated environmental conditions (dissolve nutrient load, sediment C and N content); substrate (C and NO_3^-) and temperature limitation on denitrification in Ishikari river system, Hokkaido, Japan. Denitrification rate measurement was done by using Denitrification Enzyme Activity assay (DEA assay) method [1], which is based on acetylene inhibition technique. The dissolve nitrate concentration varies from 0.3 to 20mg.L^{-1} with mean values of 5.5mg.L^{-1} in river system. The Barato lake (ox-bow) contained the highest concentration of NO_3^- (mean 8.4mg.L^{-1}, maximum 19.5mg.L^{-1}), while main channel had the lowest (mean 3.3mg.L^{-1}, maximum 8.4mg.L^{-1}). Denitrification rates showed high spatial variability (<0.01–9.16 mg N kg AFDM^{-1} h^{-1}) within Ishikari river system with barato lake showing high rate compare to main river channel. The δ^{15}N of riverine bed sediment and suspended sediment varies from 1.3‰ to 8.6‰ and 0.5‰ to 11.1‰ respectively. High δ^{15}N values of Barato Lake's bed and suspended sediments indicated the dominance of denitrification processes in the region. We selected Barato lake section of Ishikari river system to study the effect of substrate (C and NO_3^-) and temperature limitation on denitrification rate. Results indicate that carbon quantity had no significant effect (95% confidence limit) on rate of denitrification, while nitrate and temperature had significant positive effect (95% confidence limit). The denitrification rate in Baroto lake followed Michaelis-Menten kinetics having $K_m = 0.35$ mgNO$_3^-$-Nl^{-1} and $V_{max} = 2.67$ mgNkg^{-1}h^{-1}. The process of denitrification was saturated in Barato lake of Ishikari river system.

[1] Groffman *et al.* (1999) 'Denitrification' in *Standard Soil Methods for Long-Term Ecological Research* (Robertson, G.P. *et al.*) Oxford University Press, pp 272–288.