Bowels of the Earth: Natural physicochemical reactor

YO. SVOREN' AND I. NAUMKO

Institute of Geology and Geochemistry of the Combustible Minerals of NAS of Ukraine, 3a Naukova St., Lviv, 79060, Ukraine (igggk@mail.lviv.ua)

On the basis of reconstruction of the deep-seated high-temperature processes and formation conditions of minerogenesis using the data of fluid inclusion research [1] it has been possible to distinguish the formation of the majority of valuable minerals: diamonds, oil and gas, precious stones, the most important metals etc., being available in the lithosphere, synthesized with direct participation of initial matter both of the asthenosphere and lithosphere effected by the energy of magma in a newly-formed natural physicochemical reactor of the Earth's bowels.

Carbon dioxide with anomally high pressure [2] and $\delta^{13}C = -6{,}1\pm0{,}5$ ‰ [3] is the main volatile of the planet's asthenosphere as well as the initial matter for the synthesis of the diamond crystals of the highest quality, pirope (Arizona ruby), quartz, magnenite, carbonates, hydrocarbons.

Growth-synthesis of the diamond crystals is stimulated by some carbon atoms from CO_2 in the fractured zone "melting – lithospheric rocks" in the course of migration of high-temperature magmatic fluid with ferrous compounds in the electric field created by their [4]. Regular dependence of volatile compounds in mineral is determined by a number of solid inclusions their mineral composition and structure taking into account the fact that this concentration in diamonds of eclogitic paragenesis is of a higher order compared with that one in diamonds of ultrabasic-kimberlite association [5].

Hydrocarbons are synthesized [6] from any hydrocarbon-containing initial compounds in the course of a number of natural phenomena and the processes under conditions of a deep-seated high-temperature fluid: adiabatic compression-expansion, rise of electric field, reconstructive-oxidative medium and pre-plasma state of matter, formation of a majority of macro- and microcracks etc.

"Lime milk" together with CH_4 (C_nH_m), CO_2, H_2O, N_2 were an initial-primary mixture for the formation of veinlet-impregnated mineralization – the product of deep-seated high-temperature processes.

[1] Naumko (2006) Thesis for a doctor's degree, 52 p. [2] Shnyukov *et al*. (1987) *Rep of. the AS of USSR* **297,** 1457-1460. [3] Mamchur *et al*. (1981) Moscow, *GEOCHI* 234-235. [4] Svoren' (2004) Lviv, *LNU* 62-63. [5] Talnikova *et al*. (1991) *Rep. of the AS of USSR* **321,** 194-197. [6] Svoren', Naumko (2006) *Rep. of the NAS of Ukraine* **2**, 111-116.

A multi-proxy approach to submarine groundwater discharge studies: Examples from Santa Barbara, CA and Maunalua Bay, HI

P.W. SWARZENSKI[1], J.A. IZBICKI[2], E.E. GROSSMAN[1], C.R. GLENN[3], C.A. PLATH[3] AND J.L. KELLY[3]

[1]USGS, Santa Cruz, CA 95060, USA (pswarzen@usgs.gov)
[2]USGS, San Diego, CA 92101, USA
[3]University of Hawai'i, Honolulu, HI 96822, USA

Geochemical and geophysical results are used to assess submarine groundwater discharge (SGD) along two contrasting shorelines: Santa Barbara, CA and Maunalua Bay, HI. The physical SGD drivers in these systems are quite different and can be assessed using a suite of tracers, including select naturally-occurring radionuclides (^{222}Rn and $^{223,224,226,228}Ra$) and electrical resistivity techniques.

Groundwater exchange with near-shore surface water at Santa Barbara involves mostly recycled sea water. Nonetheless, sustained SGD-derived nutrient loadings provide a source of new nutrients to these coastal waters. In contrast, Maunalua Bay on southern O'ahu has abundant historic and modern SGD (Fig. 1) that includes a freshened water component and is expressed through beach springs and diffuse seepage.

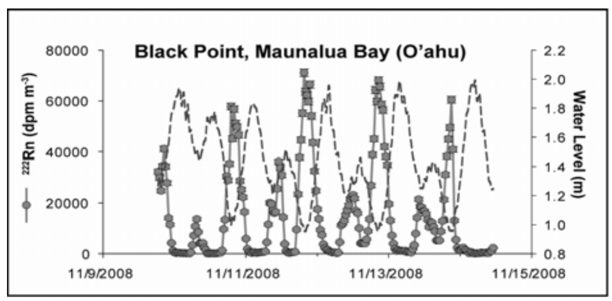

Figure 1: Example of offshore ^{222}Rn time-series (HI).