Origins and forming stages of CO_2 in Changling, Songliao Basin, China

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Changling fault depression (CLFD) is one of the fault depressions in Songliao basin, China. Recently, more and more wells with CO_2 have been found in this area. Two main CO_2 bearing formations are Quantou (K_1q) and Yingcheng(K_1yc).

The gases are characterized by high CO_2 content which are between 70.14% and 98.52% except Changling 1 gas filed (CO_2 accounts for 20.05%). The origins of CO_2 in CLFD are mainly inorganic as the $\delta^{13}C_{CO2}$ of CO_2 from CO_2 gas filed in CLFD are within the range of -4.5‰ to -8.4‰ [1]. There are two possible inorganic CO_2 sources that are carbonates decomposition and mantle-derived in Sonliao basin and Mantle-derived is the main according to the $\delta^{13}C_{CO2}$, R/Ra (where Ra is the atmospheric value of $^3He/^4He$) and the distribution of CO_2. Not only the $\delta^{13}C_{CO2}$ values from gas are not within the $\delta^{13}C_{CO2}$ of CO_2 from carbonates decomposition which range about -3‰ to +3‰, but also there are few carbonates in CLFD. So, CO_2 from CLFD may not be from carbonates decomposition. R/Ra from CO_2 gases in CLFD ranging from 1.9~7.2 indicates that He accompany with the CO_2 is from mantle according to the criteria proposed by Jenden [2]. CO_2 gases in CLFD distribute along the discordogenic faults which link with Moho-discontinuity which is at the depth of 29-31km giving the better environment for magma uprising. The homogenization temperature of CO_2 fluid inclusion from volcanic rocks ranging from 170°C to 207.4°C also shows that CO_2 gases have formed during the volcanic eruption. There have six stages of volcanic eruption. CO_2 gases bearing in K_1yc may be formed during 120-92Myr and that bearing in K_1q may be formed during 36-2Myr.

[1] Dai, J. X. *et al.* (2005) *Organic Geochemistry* **36**(12), 1664-1688. [2] Jenden P. D., Hilton D. R., Kaplan I. R. & Craig H. (1993b) Abiogenic hydrocarbons & mantle helium in oil & gas fields. In *The Future of Energy Gases*, Vol. 1570 (ed. D. G. Howell) pp. 31-56. U.S. Geological Survey Professional Paper.

Heterogeneous signature of the Saharan metacratonic crust in Central North Sudan

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Northern Sudan is marked by the complexity of its geological setting that comprises a heterogeneous Saharan Metacratonic (SM) crust [1], the Arabian Nubian Shield and the Mozambique Belt (ANS-MB) of the Neoproterozoic East African orogen that represent the suture of the collision between East and West Gondwana [2]. In this paper, we report conclusions from new geochemical and geochronological findings in Central North Sudan crystalline basement (CNSCB).

The CNSCB comprises Migmatite Gneisses (MG) with Associated Granitoid melts (AGrs) and a Ring Complex Granitoid suite (RCGrs). Volcanic arc granitoid geochemical features were obtained for MG and AGrs while RCGrs portrayed within-plate granitoid features. Identical zircon U-Pb ages (mean = 602 ± 13 Ma) were obtained for MG and AGr, while RCGrs yielded two groups of ages: (1) young (707.6 ± 1 Ma) and (2) old (717 ± 1 Ma). Biotite Rb/Sr analyses yielded identical cooling ages (mean = 567.5 ± 2.8 Ma). Sr and Nd isotope data (Sr_i = 0.70152 to 0.72104, εNd = -3.5 to -8.9 for MGs and AGrs; and Sr_i = 0.70131, εNd = +5.6 to +6.9 for RCGrs) portray crustal and mantle sources respectively.

While RCGr age and isotope data indicate two anorogenic mantle source intrusion episodes, similar MG and AGr data suggest crustal sources and coeval granitization and migmatization of CNSCB. MG-AGrs and RCGrs age and isotope and geochemical data indicate a heterogeneous nature of the CNSCB, which is a finger print feature of the SM but not for the ANS nor for the MB. This has serious implications for their boundary limitations, which in this case should be further east of the study area. Pan-African biotite ages show that the CNSCB has not been affected by Paleogene to recent East African tectono-metamorphism and rifting geodynamics.

[1] Abdelsalam *et al.* (2002) *J. Afr. Earth. Sci*. **34**, 119-136. [2] Abdelsalam & Stern (1996) *J. Geophys. Res.* **101**, 23063-23076.