An abiogenic alkane gas field, Changde gas field in Songliao Basin, NE China, resulted from CO_2 loss

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Changde gas field, it was thought to be the unique abiogenic alkane gas field in the world, lies in the Songliao Baisn, NE China [1]. $\delta^{13}C_1$ is -18.9‰, $\delta^{13}C_2$ is -19.0‰, $\delta^{13}C_3$ is -34.1‰ [1]. $\delta^{13}C_1$ is heavier than that of coally derived gases at high maturity, carbon isotopes are reversed, and R/Ra > 1, all these feature indicate the gas is abiogenic. But the gases are methane dominated and different from other abiogenic gases in the world. how it was come into being.

$CO_2/^3He$ ratio of gases from mantle is distributed in a constant range of $2\sim7\times10^9$ [2]. The ratio in Changde gas field of Fangshen2 is 9.67×10^6 and $C_{total}/^3He$ is 3.3×10^8. Two reasons can cause this result, the one is CO_2 losing and the other is ^3He added during the geological time.

Abnormal ^3He concentration can caused by radioactive decay of Li (^6Li (n, α)^3H). Li concentration in this area is in normal level. Consequently, the reason that caused $CO_2/^3He$ ratio become smaller is CO_2 decreasing. Through the evolutionary mode of $CO_2/^3He$ and CO_2, the typical abiogenic methane of Fangshen 2 is resulted from dramatically CO_2 losing. By calculation, over 90% of CO_2 have lost. Meanwihle, part of the abiogenic methane transformed form CO_2 by Fischer-Tropsch synthesis.

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Spatial extent of influence of deeply subducted continental crust to adjacent lithosphere: Constraints from Sr-Nd-Pb isotopic compositions of Mesozoic gabbros and high-Mg diorites in western Shandong, China

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The spatial variations of Sr-Nd-Pb isotopic compositions of early Cretaceous gabbros and high-Mg diorites entraining the mantle-derived peridotite xenoliths from western Shandong provide insight into the influence of the deeply subducted Yangtze slab on adjacent lithosphere of the North China Craton (NCC). Jinan, Zouping and Jinling gabbros and high-Mg diorites far away the Tan-Lu fault zone have $(^{87}Sr/^{86}Sr)_i$ = 0.7042 ~ 0.7055, ε_{Nd} (t) = -3.92 ~ -18.83, $(^{206}Pb/^{204}Pb)_i$ = 16.55 ~ 17.11, $(^{208}Pb/^{204}Pb)_i$ = 36.29 ~ 37.10, whereas Qingtuo gabbro-diorites adjacent to the Tan-Lu fault zone, together with the contemporaneous Fangcheng and Feixian basalts, have $(^{87}Sr/^{86}Sr)_i$ = 0.7096 ~ 0.7117, ε_{Nd} (t) = -13.04 ~ -16.60, $(^{206}Pb/^{204}Pb)_i$ = 17.18 ~ 17.64 and $(^{208}Pb/^{204}Pb)_i$= 37.41 ~ 38.47. The initial $^{87}Sr/^{86}Sr$ ratios and ε_{Nd} (t) values of Tietonggou and Jiaoyu high-Mg diorites located between above-mentioned them range from 0.7059 ~ 0.7075 and -7.82 ~ -15.64, respectively. Based on the efficient marks (ages and Pb isotopic compositions) to distinguish the NCC basement from the Yangtze Craton (YC) basement [1, 2], together with Pb isotopic compositions of contemporaneous Xu-Huai adakitic rocks, it is suggested that magma sources for Qingtuo, Fangcheng, Feixian, Tietonggou, and Jianyu mafic-intermediate igneous rocks could been mainly modified by the YC basement, whereas the magma sources for Jinan, Zouping and Jinling intrusions far away the Tan-Lu fault zone could be mainly subjected to modification of the delaminated NCC lower crust-derived melts. Therefore, we conclude that the influencing lateral extent of the deeply subducted Yangtze slab on adjacent lithospheric mantle of the NCC is about 100 km.

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