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Researches on Shallow Gas Distribution, Genesis Identification and Favorable Exploration
Area in northern Songliao basin

Wang Xiaobo^{1,2}, Zhang Ying^{1,2}, Li Jian^{1,2}, Wang Dongliang^{1,2}, Yang Chunxia¹, Li Jin^{1,2}

¹Research Institute of Petroleum Exploration and Development, Langfang, PetroChina, CNPC, Langfang, Hebei,
China

²The Key Laboratory of Gas Reservoir Formation and Development, CNPC, Langfang, Hebei, China]

At present, the shallow gas is actively explored worldwide, especially in northern America [1~6]. It has become the key point for gas reserves and production increasing. Most of shallow gas resources in china are biogenic gas and mainly distribute in Qaidam basin [7~9], and some other important distribution areas are Songliao, Bohaiwan, Sichuan, Tarim, Ordos and so on. Songliao basin is the most important oil bearing basin in china [10], in recent several years great breakthrough has been made in deep gas exploration. Currently, the exploration situation that finding oil in shallow and medium layer and finding deep gas in deep volcanic rock are formed. But compared to the deep layer, the shallow layer and shallow gas are rarely studied. The geochemical characteristics, genesis types, distribution regulation and favorable exploration areas and direction of shallow gas are needed to be further studied. So, the researches in this paper are favorable for understanding the distribution and favorable exploration area for shallow gas, and carrying out the aimed exploration activities according to genetic types of shallow gas. It is of great theoretical and realistic guiding significances for shallow gas especially shallow biogenic gas explorations in northern Songliao basin.

By engaging in the study of shallow gas distribution, genesis identification and favorable exploration areas of northern Songliao basin in this paper, the main recognitions are concluded as follow: (1) The shallow gas is abundant and widely distributed in northern Songliao basin (Fig.1), spreading in different horizontal area and different vertical layers. The productions of shallow gas are high, and most are from 600 to 800m. (2) The methane content of shallow gas in northern Songliao basin ranges from 90% to 100%; the dry coefficient is mainly varied from 0.98 to 1.00; the distribution range of methane carbon isotope is relatively wide, and the main frequency is from -60‰ to -30‰. (3) The genetic types of shallow gas in northern Songliao basin can be divided into: I biogenic gas, II biogenic and thermal genetic mixed gas, III thermal genetic gas (III₁ mature oil-associated gas, III₂ high mature coal-formed gas). The shallow gas in Mingshui formation (K₂m) is completely biogenic gas; in Heidimiao oil formation (H) are main biogenic gas, and partly are biogenic and thermal mixed gas or thermal oil-associated gas; in Saertu oil

formation(S),Putaoehua oil formation(P)and Gaotaizi oil formation(G)are main thermal genetic oil-associated gas, partly are biogenic gas in some place; in Fuyu and Yangdachengzi oil formation(F,Y) are main thermal genetic coal-formed gas.(4)By combining shallow gas genesis identification and distribution characteristics researches, the favorable exploration areas are pointed out: ①The shallow biogenic gas has more expansive resources and exploration prospects than shallow thermal genetic gas②The middle combination of Saertu oil formation (S) in west slope area, the upper combination of Heidimiao oil formation and above (H, K₂m) in central depression area and the middle combination of Putaoehua oil formation (P) in Chaoyanggou terrace in central depression area are favorable exploration zone for shallow biogenic gas.

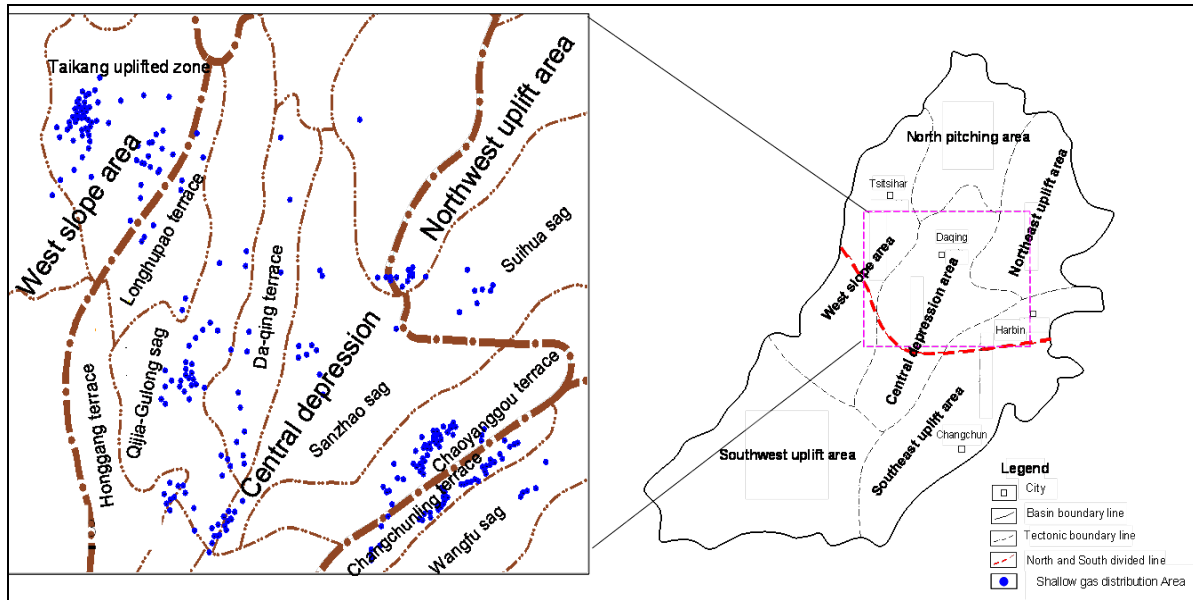


Fig.1 The shallow gas distribution area in northern Songliao basin

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