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Sr Isotope Geochemistry and Depositional Setting of Carbonate in Ordovician, Ordos Basin, China

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China is in severe shortage of potash reserves, and the best way for breakthrough is to make potash exploration in marine salt basins. Erdos basin is so far the only Ordovician potash basin in the world. The Erdos basin is located west the North China platform, is a rectangle structural basin, the area approximately 2. 5×10^5 km^2 (Liu et al., 2006; Feng et al., 1998). The occurrence of thin sylvite layer and thick high potash mineralization layers in the 6th sub-member of the 5th member of Majiagou Formation in serves apparent clues for potassium accumulation and prospecting. Comparative analysis on other similar ultra-large marine potash deposits abroad revealed that the North China Salt mineral genetic domain must be studied as a whole to accurately explain the conditions and mechanism of potassium accumulation. While due to the development of a large set of Majiagou rock salt and potash mineralization discovered thus become the focus predecessors were sequence system, petrographic study of ancient geography, structure and other aspects (Hou et al., 1995)

Predecessors research indicated that the spread of groove controlled saline and oil & gas. The Sr isotope can reflect tectonic-depositional setting and not influenced by diagenesis in the later stage (Albarède et al., 1991; Weis et al., 12987; Huang et al., 1995; Xie et al., 2002).

On the basis of the predecessors, though assembly sampling, This study would use Sr isotope of Ordovician carbonate in the Ordos basin ascertain depositional setting, established Sr isotope evolution curve and compare with globle.

The time of Sr remaining in the ocean millions of years at least, and in the ocean Sr mixing time is only a thousand years, so the distribution of Sr is uniform, without latitude, depth of seawater Sr isotope reflects current global tectonic climate background. The strontium isotope composition and its changes may reflect crustal hydrothermal activity history and historical events, and further reflect clastic sedimentary environments and material sources. $^{87}Sr/^{86}Sr$ initial value is relatively large, indicating that this period of time sufficient supply of terrigenous continental erosion or strong (Bertram et al., 1992). Initial ^{87}Sr/86Sr ratios higher sea level is lower, the smaller the ancient land area (Vail et al., 1977). $^{87}Sr/^{86}Sr$ in the ocean, influenced by the hot water. Seafloor hydrothermal and river interactions affect seawater Sr isotopic compositions there is a big controversy. Spooner (1977) pointed out that the ocean $^{87}Sr/^{86}Sr$ rivers flow into the sea than land-based sources of 87Sr/86Sr to be small. He also proposed the time evolution of the hydrothermal Sr isotopic little change. However Albarede et al. (1981) proposed injection InterRidge Sr loss of four times the mainland but since these two factors exist in a system, it is difficult to distinguish. Weis and Wasserburg (1987) proposed εSr values can be used to determine the formation of chert environment, εSr larger the value, indicating the greater impact by provenance. While many scholars $^{87}Sr/^{86}Sr$ evolution curve for sea-level change studies (eg Bertram et al., 1992; Huang et al, 1999, etc.).

Depositional environment can used $^{87}Sr/^{86}Sr$ and REE pattern semi-quantitative (surface water or deep sea, coastal waters or river). Also can use its εSr (t), Sr model ages tDM and ∫Rb/Sr isotopic characteristics of such parameters to sensitively reflect the time evolution of seawater Sr situation.Also can use its εSr (t), Sr model ages t_{DM} and ∫ Rb/Sr isotopic characteristics of such parameters to sensitively reflect the time evolution of seawater Sr situation.

$$(^{87}Sr/^{86}Sr)\ t = (^{87}Sr/^{86}Sr)\ 0 + (^{87}Rb/^{86}Sr)\ (e^{\lambda}t-1)$$

$$t_{DM} = 1/\lambda^{Rb}\ Ln\ \{1+[(^{87}Sr/^{86}Sr)s/(^{87}Sr/^{86}Sr)_{DM}]/\ [(^{87}Rb/^{86}Sr)\ s/(^{87}Rb/^{86}Sr)_{DM}]\}$$

$$\varepsilon Sr(t) = [(^{87}Sr/^{86}Sr)s,t/(^{87}Sr/^{86}Sr)CHUR,t-1]\times10000$$

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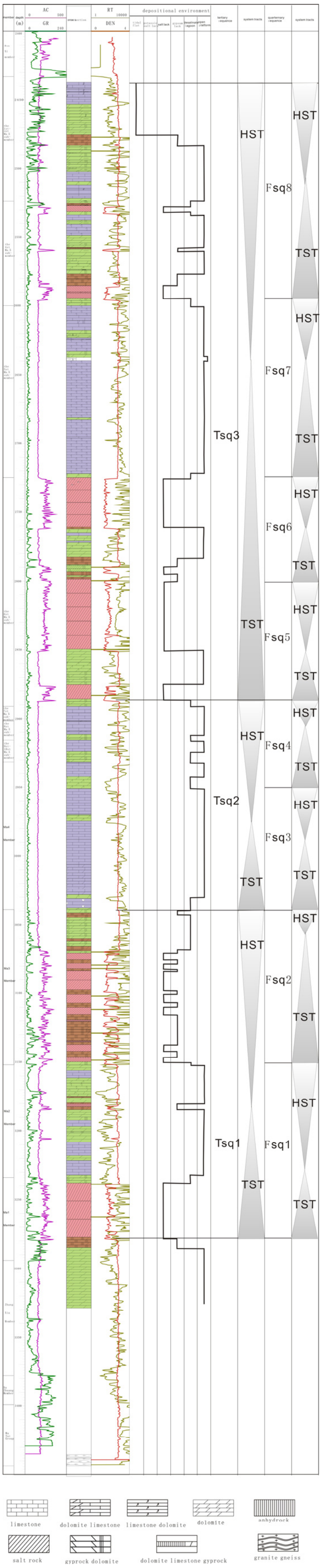

Fig. 1. Sequence and sedimentary environment comprehensive analysis histogram Zhen k 1 well Majiagou Group Ordovician .

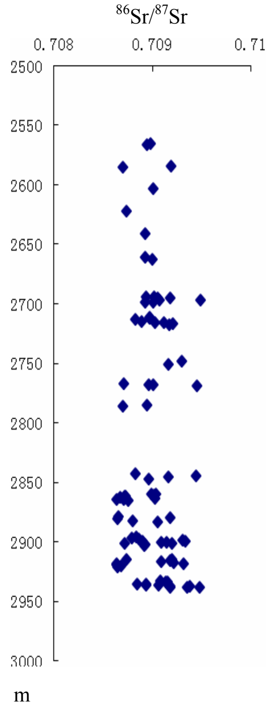

Fig. 2. $^{87}Sr/^{86}Sr$ value alters with time of Zhen sylvite 1 well Ordos Basin.

Magnificant positive correlation evolutionary trend, indicating that Rb is mainly affected by terrigenous detrital material input control, Rb and K enriched in acidic rocks, Sr, and Ca enriched in mafic rocks, so Rb/Sr ratios can be an indirect indicator of the composition and nature of the rock.

Noted Majiagou maximum thickness of more than 1000 m, which can be divided into strata division bottom-up horse to horse sixth period of six lithologic (Fig. 1) (Editorial Department of Chinese Stratigraphy 1996; Feng et al ., 1998). Ma1, Ma3 and Ma5, hot and dry climate, sea level dropped, concentrated into a deep depression sea salt characteristics, shelf basin development of anhydrite rock containing dolomite, rock salt rock basin, basin margin mainly developed dolomite - anhydrite rock Ping, Ma five o'clock the western edge of anhydrite rock - dolomite plateau development. Ma2 and Ma4 seasons hot and humid climate, sea level rise, the continental shelf into the limestone dolomite basin development, the development of the surrounding basin margin (inclusive) dolomite - limestone plateau.

From the date and Figure 2 the $^{87}Sr/^{86}Sr$ value alters with time of Zhen sylvite 1 well Ordos Basin, we can draw the conclusion that the $^{87}Sr/^{86}Sr$ value from Ma4 member decrease and then Ma5 begin to increase. After that value from the 6th Ma 5 sub-member begin to increase and then decrease until the middle of 6th Ma 5 sub-member and then increase. The change of $^{87}Sr/^{86}Sr$ is coincidence with the lithology and climate change.

Key words: Sr isotope, Depositional settings, Basin evolution, Ordos basin, Ordovician

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