

New Understanding of Changxing Formation reefs in Permian in eastern Sichuan area, China

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Reefs have been reported in Changxing formation within the eastern Sichuan area, are important gas reservoirs.[1] They have been characterized by coralline sponges, including the sphinctozoans and inozoans as their framebuilder.[2] These reefs are mainly divided into platform marginal reef and patch reef in platform, with obvious different characteristics. The platform marginal reef is characterized by large scale, integrate facies belt of reef combination, strong water energy, controlled by paleogeographic location and paleogeomorphic environment, and fasciculate distribution mainly on both sides of the oceanic trough. In contrast, the patch reef in platform is characterized by small scale, weak water energy, a few reef-forming organism individual, no deposition of reef front or reef back, more cycles of the reef, development of thrombolite, inexplicit distribution regularity, controlled by paleogeomorphology, and random distribution along local highland in the platform(Figure1). Samples of reefs rock and host rock were examined using thin sections, casting sections and scanning electron microscope experiments. and the application of various analytical techniques including analysis to reservoir properties - pore structure parameters curve and pattern analysis of pore structure, reservoir characteristics of reef have been thoroughly investigated. The results revealed a very close relationship between the reservoir and reefs. The reservoir were be strictly controlled by both sedimentary microfacies and lithology. The favorable facies belt includes framework reef and bonding reef. The rock types of reservoir mainly are dolomite particles, micrite particles and the bioclastic. The reef has complex types of pores, and the reservoir space of reef including intergranular dissolution pore, large dissolution pore, dissolution pore, intragranular dissolved pore and large cavity pore. The formation of the pores are mainly affected by the cementation and dissolution with few primary pores, however, the secondary pores are abundant and form excellent reservoir for gas.

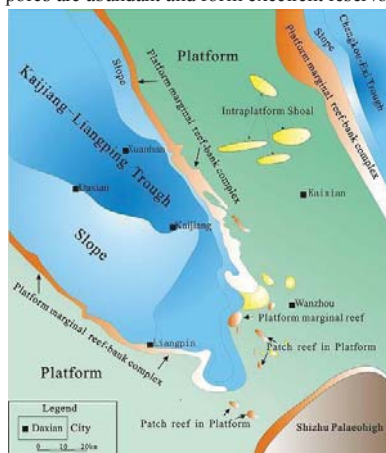


Figure1:Map of Sedimentary Facies and Its Distribution in Changxing Formation, Eastern Sichuan Area

[1]Zhang Tingshan, Jiang Zhaoyong, Chen Xiao-hui(2008)Characteristics and controlling factors of development of Paleozoic reef-banks in the Sichuan basin[J]. *Geology in China*,**35**(5):1017-1030.

[2]Yang Wanrong, Li Xun(1995)Permian reef types and controlling factors of reef formation in south china[J].*Acta Palaeontologica Sinica*, **34**(1):67-77.

Re-Os isotopes of Chaihe mantle xenoliths constrain the age of the subcontinental lithospheric mantle in Inner Mongolia Province, China

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Nearly 30 Cenozoic volcanoes that were erupted during the Pleistocene-Holocene have been discovered in Chaihe area, mid-Great Xing'an Range. The Holocene alkaline basalts contain abundant mantle xenoliths. The 27 samples selected in this study are composed of 11 spinel lherzolites, 8 spinel harzburgites, 7 garnet lherzolites and one garnet harzburgite. The garnet is commonly kelyphited. The spinel lherzolites contain 1.36-3.52 wt.% Al₂O₃ and 1.55-3.84 wt.% CaO, whereas the harzburgites have lower contents of both Al₂O₃ and CaO, i.e. ~0.46-1.69 wt.% and ~0.36-1.32 wt.%, respectively. Clinopyroxene in the harzburgites is enriched in LREE, and displays negative Ba, Nb, Zr, Hf and Ti anomalies. Clinopyroxene in the lherzolites show variable REE patterns, such as LREE-enriched, LREE-depleted and MREE-enriched patterns. The Chaihe xenoliths have ¹⁸⁷Os/¹⁸⁸Os ratios ranging from 0.1106 to 0.1276. The most refractory spinel harzburgite (03Ch-10), with an olivine Fo value of 92.1, has the lowest ¹⁸⁷Os/¹⁸⁸Os ratios of 0.1106, which gives a rehenium depletion age (T_{RD}) of 2.6 Ga relative to the primitive upper mantle (PUM). Sr-Nd-Hf isotopes (⁸⁷Sr/⁸⁶Sr= 0.70665, ¹⁴³Nd/¹⁴⁴Nd=0.51289, ¹⁷⁶Hf/¹⁷⁷Hf=0.282805) of clinopyroxene in this sample is slightly more enriched than that in other samples (⁸⁷Sr/⁸⁶Sr= 0.70252-0.70504, ¹⁴³Nd/¹⁴⁴Nd=0.51289-0.51366, ¹⁷⁶Hf/¹⁷⁷Hf=0.283125-0.284552). This indicates the existence of ancient lithospheric mantle relics in the Chaihe region. On the other hand, the ¹⁸⁷Os/¹⁸⁸Os ratios are 0.12066-0.12755 in spinel lherzolites, 0.12278-0.12716 in garnet lherzolites, 0.11214-0.12359 in spinel harzburgites (except 03Ch-10), and 0.11453 in garnet harzburgite. Most of xenoliths have ¹⁸⁷Os/¹⁸⁸Os ratios indistinguishable from the modern convecting upper mantle [1], and their clinopyroxenes also have depleted Sr-Nd-Hf isotope compositions. Therefore, lithospheric mantle in the Chaihe region is mainly composed of juvenile mantle accreted from the asthenosphere, but with minor ancient mantle relics.

[1] Liu *et al.* (2008) *Nature* **452**, 311-316.