SUN Zhongjun, QIN Aihua, YANG Zhibin, ZHANG Fugui, ZHOU Yalong and ZHANG Shunyao, 2013. Research on the Soil Natural Thermoluminescence Exploration Technology of Gas Hydrate in Qilian Mountain. *Acta Geologica Sinica* (English Edition), 87(supp.): 1003.

Research on the Soil Natural Thermoluminescence Exploration Technology of Gas Hydrate in Qilian Mountain

SUN Zhongjun, QIN Aihua, YANG Zhibin, ZHANG Fugui, ZHOU Yalong and ZHANG Shunyao

Institute of Geophysical& Geochemical Exploration, Chinese Academy of Geological Sciences, Langfang 065000, China

The exploration technology of gas hydrate in polar permafrost region primary include seismic and well log, which have gotten obviously geological achievement. Most permafrost in china is located in middle latitude region. Because of the obscure difference of seismic reflex signal between gas hydrate layer and surrounding rock, it is difficult to apply the seismic technology. Therefore, further research on exploration technology of permafrost gas hydrate in middle latitude region would be needed.

The soil natural thermoluminescence is a technology to measure cumulative thermo luminescence intensity of soil natural mineral which generate by natural radiation at regular geologic age by high-accuracy TL apparatus. This technology is applied with two basic premises: 1. The U6+ in oxidation environment will be settlement in traps fill with hydro carbon. 2. Hydro carbon, radioactive substance and grains of minerals spilled from reservoir will cause surface anomaly, which have a special correlation with deep oil and gas reservoir. According to foreign data, the gas hydrae in permafrost region belong among the same petrol system with traditional oil and gas. Therefore, it provides basis for the soil natural thermoluminescence technology of gas hydrate in permafrost region.

Inspirable results have been attained from the experiment of soil natural thermoluminescence in permafrost region of Qilian Mountain. Firstly, the anomaly of soil nature thermoluminescence is well consistent with gas hydrate mineral. Not only designate the border of existing gas hydrate mineral, but also predict potential areas. The four known gas hydrate wells (DK1, DK2, DK3 and DK7) are in the thermoluminescence anomaly area, while other three wells (DK4, DK5 and DK6) which no gas hydrate shows are outside of the area. Secondly, the soil nature thermoluminescence in the swamp area is a kind of cumulative technology. It will reduce the impact of some environmental factors (such as the change of soil temperature, soil humidness, sampling time, atmosphere, wind or rain, underground water level, soil freezing or melting) and improved testing accuracy. Thirdly, this method is simple and efficient, only requires once sampling in the field. Compare with the method of tablet thermoluminescence, this method will cut the workload by 50%. Although the technology of soil nature thermoluminescence requires further research, it is an effective assistive technology in the area which seismic cannot be used.

Key words: Gas hydrate, Middle latitude permafrost, Qilian mountain, Soil natural thermoluminescence, Environmental factors

* Corresponding author. E-mail: sunzhongjun@igge.cn