This article basically talks about the Junggar basin composed of the Jingjingzigou formation, the Lucaogou Formation and the Hongyachi Formations and also documents their evolution, development, composition and also their age. It also focuses on their characteristic elements that are able to be identified using biomarkers tests. It also looks at the use of the specific biomarkers to identify and determine the composition and age of the Formations of the Junggar basin rocks. These include β-carotane that is consistent with the specialized saline and hyper saline biota of the Jingjingzigou Formation. It reports that the biomarker distribution in the Jingjingzigou extracts resemble the oils from the Karamay oilfields. It also looks at the Lucaogou Formation that represents one of the richest and largest lacustrine source rock intervals worldwide yet its formation is inconsistent with the conventional lacustrine source rock models that its deposition occurred at middle level paleolatitudes of 39º to 43º N instead of the tropics. And by virtue of being lacking in nutrient supply thus dominated by intermediate volcanic rocks hence causing low to moderate primary productivities. Hence stable salinity stratification and low inorganic sedimentation led to deposits of 20% Total Organic Carbon content and a HI of about 800 while the underlying Hongyachi Formation has about 1-5% Total Organic Carbon content and low HI. This was deposited in fresh water oxic and sub oxic lakes.

Several studies by different authors have shown that biomarkers may be used to determine organic matter type, depositional environment and thermal maturity of lacustrine organic rich facies. Study carried out by Carroll et al. (1992), defined that there are 3 upper Permian Formations containing significant organic rich mudstones ranging from different ages with the Jingjingzigou Formation being the oldest, followed by Lucaogou and then Hongyachi being the youngest.

The paper documented that both the Jingjingzigou Formation and the Lucaogou Formations extracts have relatively light carbon isotopic compositions. Sedimentary lithofacies and show that silicic mudstones dominate all the lacustrine facies and compose variable amounts of carbonate and coarser grained siliciclastic rocks. It goes on to record that the Jingjingzigou Formation has gray and gray-green mudstones, medium to dark gray mudstones, wave ripped dolomite siltstones and fine grained sandstones. The Lucaogou Formation consists of exclusively laminated dark grained mudstones.

Bulk organic matter mudstones extracts show that the Jingjingzigou Formation has high amounts of amorphous kerogen content with vitrite and inertintite of up to 78% content, with fluorescent amorphous material have kerogens composing of up to 58% of the Lucaogou Formation while the Hongyachi Formation has up to 45 % Vitrite and inertintite content.

Carbons and acyclic alkanes and β-carotanes dominate the Jingjingzigou Formation. ϒ-carotanes are also recorded to be present in these formations. This abundance of polycyclic alkanes, n-alkanes, β-carotanes and isoprenoids increases gradually upwards from Jingjingzigou, Lucaogou and Hongyachi stratigraphs.

References

Carroll, A. R. (1998). Upper Permian lacustrine organic facies evolution, Southern Junggar basin, Northwest China. Organic Geochem. Elsevier Science Ltd. Vol 28, No. 11, pp. 649-667.