Петрографи

DETRITAL MODES OF THE CRETACEOUS INGIIN NARS SANDSTONES IN THE SAINSHAND BASIN

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1. INTRODUCTION

The Ingiin-Nars property is located in the southern part of the Sainshand sedimentary Basin. The basins is filled with syn & post riftogenic alluvial, fluvial, and lacustrine and limnic sedimentary rocks of Early to Late Cretaceous age, which are covered by Paleocene to Quaternary alluvium loose sediments. Paleozoic to Jurassic, meta-sediments and granites form the basement of the basin. The older sequences were affected by the Caledonian progeny. Basins were down faulted during Cretaceous time. The study sandstone of the Ingiin Nars area is classified as arkosic type. Considering the sandstone modal composition the studied sandstones are derived from continental block orogin.

Key words: sandstone, continental block, Cretaceous, diagram

2. GEOLOGICAL SETTING

The Ingiin –Nars property is positioned at the NE margin of the Tugrug horst in the southern edge of the Sainshand basin. Local geology consists of Silurian terrigenic schist and Late Carboniferous granodiorite which formed basement of Sainshand basin and Mesozoic sediments consists of mainly Upper Cretaceous Sainshand

formations. The Sainshand formation is Upper Cretaceous in age and is divided in to lower Sainshand ($K_2 ss_1$) and upper Sainshand members ($K_2 ss_2$).

The Upper Sainshand formation is located in the central portion of the property where the Lower Sainshand formation is located in the north-eastern corner of the property. Upper Sainshand member transgressive overlapping lower Sainshand and subdivided into: lower-clayey-sand (70-130m) and upper-red color clay (40-50m). The Lower Sainshand member composed of rhythmic interbedding of sand, gravel, conglomeratic-sandstone with intercalating of variable colored clay horizons. Total thickness of Sainshand formation within the property varies from 300-400m.

The prospective sedimentary basins related to a large regional tectonic belt that extends in an arc from NE Mongolia to southern Mongolia.

The sandstone type uranium Nars Deposit is located in the southern flange of Sainshand basin, in the range of northern and eastern framing of Tugrug horst.

In the modern truncation Tugrug horst is correspond to basement, which are consist of siltstone, sandstone, tuff-sandstone of Middle-Upper Devonian Gurvansaihan formation, sedimentary rocks of Jurassic Sharil formation and basalts of Lower cretaceous Tsagaan tsav formation. Basement rocks cover in 20x7km area, elongated to the E-N-E direction. Northern, eastern part of horst limited by North-Tushleg and Mys fault with 700-800m movement. From south this structure is limited by Suuj fault with vertical displacement of 500m. Near the faults loose sediments of cover if folded. Structure of Ingiin and Nars sector have two type of fault: NE and NW direction. In the NE fault is dominated normal fault-outburst movement of cover and second NW is strike-slip fault.

3. METHODS

Eleven sandstone samples were collected from the Cretaceous sediments of the study area. Thin sections were examined under the polarizing microscope and point-

counted using Gazzi-Dickinson method. The modal compositions of detrital and diagenetic components and pore types were determined by counting three hundred points per thin sections. As well as, two thin sections were determined as mineralogical composition under the microscope.

4. RESULTS

Definitions of grain parameters are explained in table 1; raw and recalculated point-counting data are shown in tables 2; respectively.

Definitions of grain parameters

Table 1

Q-F-L	Qm-F-Lt
Q=Qm+Qp, where: Qt=total quatz grains Qm=monocrystalline quartz Qp=polycrystalline quartz F=Pl+K F=total feldspar grains K=potassium feldspar L=Ls+Lm+Lv, where Ls=total sedimentary fragments Lm=metamorphic lithic fragments Lv=total volcanic lithic fragments	Qm=monocrystalline quartz F=total feldspar Lt=total lithic fragments+polycrystalline quartz
	Qp-Lvm-Lsm
	Qp=polycrystalline quartz Lvm=total volcanic and metamorphic lithic fragments Lsm=total sedimentary and metasedimentary lithic fragments

Recalculated point-count data of the study area

Table 2.

Sample	Q-F-L,%			Qm-F-L,%			Qp-Lvm-Lsm,%		
	Q	F	L	Qm	F	L	Qp	Lvm	Lsm
TsIN001-1	55.152	40.649	4.198	46.946	40.648	12.404	69.354	9.677	20.967
TsIN001-3	71.218	28.229	0.554	65.682	28.228	6.0885	90.909	0	9.090
TsIN001-4	47.178	41.389	11.433	42.836	41.389	15.774	27.522	66.972	5.504
TsIN001-5	50.755	43.807	5.438	42.749	43.806	13.444	59.550	40.449	0
TsIN001-6	52.824	45.649	1.527	44.274	45.648	10.076	84.848	15.151	0
TsIN001-7	54.311	43.853	1.835	37.247	43.853	18.899	90.291	9.708	0
TsIN004-4-1	50.763	45.610	3.626	43.129	45.610	11.259	75.471	18.867	5.660
TsIN004-4-2	56.994	41.278	1.727	55.267	41.278	3.454	50	50	0
TsIND0-3-1	70.841	28.037	1.121	47.289	28.037	24.672	95.454	4.545	0

Some unidentified framework and accessory mineral grains were not counted, but they are minor and thus unimportant.

Petrographic characteristics of point-counting sandstones in the study area are described as follows. Thin sections were point-counted using Gazzi-Dickinson method. These sandstones are composed of mineral and rock fragments. Size of fragments is ranging from 0.04 mm to 2 mm and sometimes up to 3.75 mm. Mineral fragments are predominated in the fragments. They are quartz, plagioclase and potassium feldspar rarely mica. Quartz is abundant mineral in the study area. Quartz grains are classified as monocrystalline and polycrystalline. Monocrystalline quartz dominates over polycrystalline quartz. In feldspar grains, potassium feldspar is more abundant than plagioclase. Potassium feldspar was replaced by pellite. As well as, plagioclase was partially changed to pellite, sericite rarely epidote and carbonate.

Lithic fragments are volcanic, sedimentary seldom-metamorphic rock, of which volcanic fragments are most abundant. Rock fragments show microporphyritic, microfelsitic, aleurite rarely microgranobalstic texture.

All fragments are cemented by clay sometimes clayey-micaceous aggregates. As well as, they are rarely cemented by carbonate. Opaque mineral rarely tourmaline, zircon and sphene are existed as accessory phases in the rock. Porosity of sandstones in the area ranges from 3.0% to 31% of the rock volume.

Sandstone classification

Nine sandstones of the study area are classified as arkose. (Fig. 1).

5. PROVENANCE

5.1 Qt-F-L Diagram

On the Qt-F-L diagram, eight sandstones plot in the continental block and one sandstone plots in the dissected arc fields (Fig. 2). Continental block sandstones are subdivided into three parts such as craton interior, transitional continental and basement uplift.

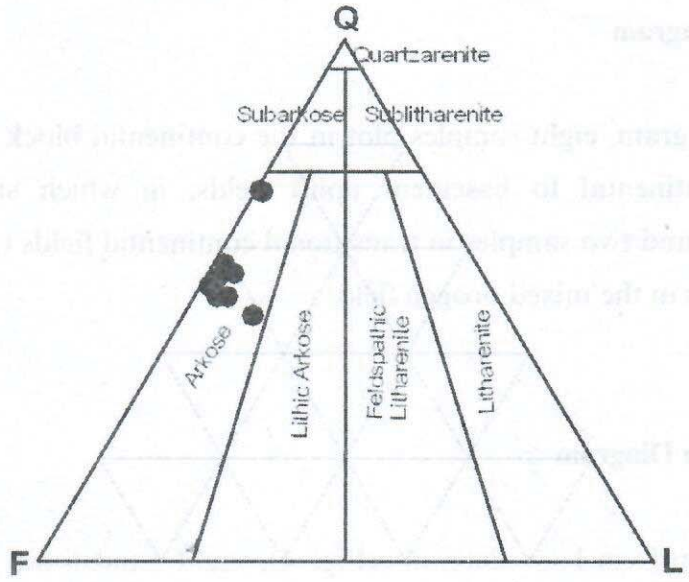

Fig. 1. Classification of sandstone of the study area after Folk (1968). Sandstone type is arkose.

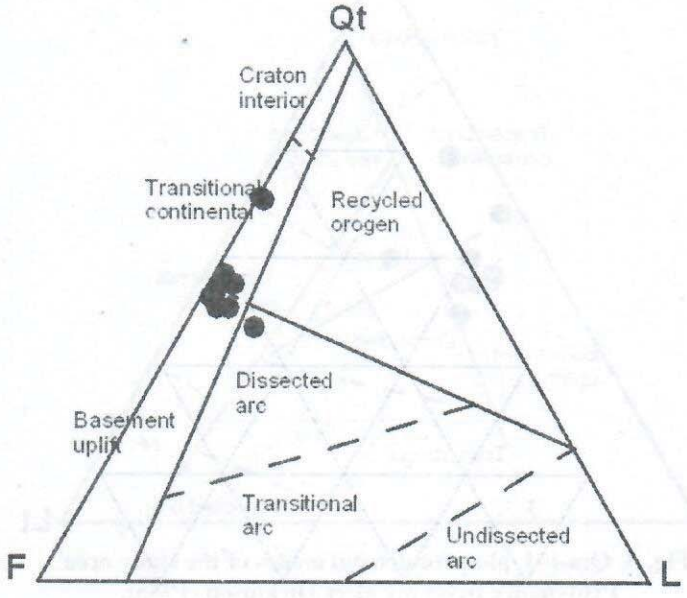

Fig. 2. Qt-F-L plots for detrital modes of the study area. Provenance fields are after Dickinson (1985).

5.2 Qm-F-Lt Diagram

In this diagram, eight samples plot in the continental block field, ranging from transitional continental to basement uplift fields, in which six samples plot in basement uplift and two samples in transitional continental fields (Fig. 3). In addition, one sample plots in the mixed orogen field.

5.3 Qp-Lvm-Lsm Diagram

On the Qp-Lvm-Lsm diagram (Fig. 4), eight sandstones plot in the mixed orogenic sands field. As well as, one-sandstone plots in the collision suture, fold trust-belt sources.

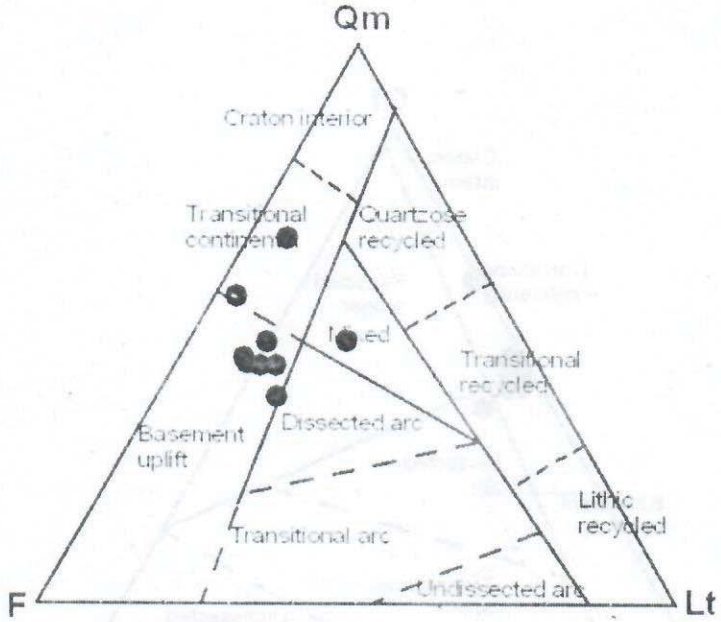

Fig. 3. Qm-F-l plots for detrital modes of the study area. Provenance fields are after Dickinson (1985).

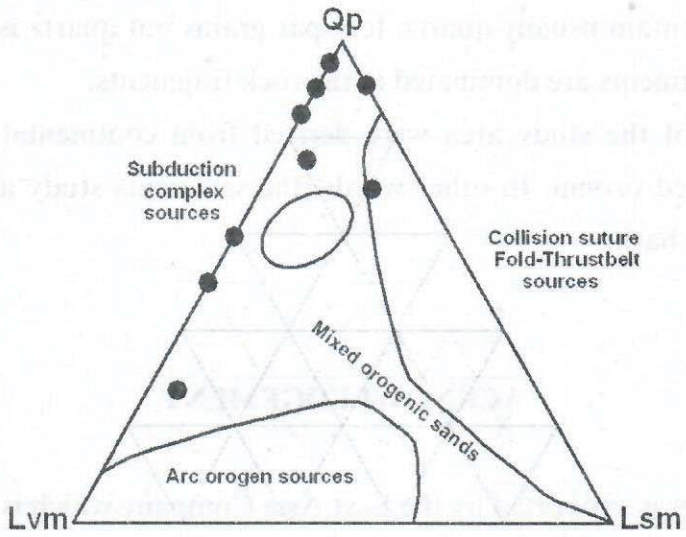

Fig. 4. Qp-Lvm-Lsm plots for detrital modes of the study area. Provenance fields are after Dickinson (1985).

Various provenance types of the study area show in the table 3. Most important provenance type is continental block.

Various provenance types of the study area.

Table 3.

Age	Qt-F-L	Qm-F-L	Qp-Lvm-Lsm
Lower Cretaceous	Continental Block(Transitional continental to basement uplift)	Continental Block-mixed orogen (Transitional continental to basement uplift)	Mixed orogenic sand

5. CONCLUSION

Based on petrographical studies on Cretaceous sandstones, we conclude the following:

-The petrographical study of Cretaceous sandstones revealed that sandstones are arkose.

-All sandstones contain usually quartz, feldspar grains but quartz is more dominated. Volcanic rock fragments are dominated in the rock fragments.

-The sandstones of the study area were derived from continental block with some detritus from mixed orogin. In other words, the sediments study area formed in the continental rifting basin.

ACKNOWLEDGEMENT

This work was supported by the East Asia Company which is gratefully acknowledged. Special thanks to the geologists.

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Miranov.U.B, Uran Mongolii, Mockva 2004