

## **Geology of Precambrian Rocks in Central Iran, as Evidence of Metallogenic province and Metallogenic Epoch for Metallic Deposits.**

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### **ABSTRACT**

*The sequences of low to high grade metamorphic rocks of Precambrian age with the thickness of about 2000 meters exposed in Central Iran. The Precambrian rocks of Iran can be divided into two main groups. The first one is the metamorphic complex which are called the basement rocks of Precambrian overlay disconformities by of Katangan rock, and the second one which are more as marginal continent, they deposited after the Katangan Orogeny, are called late-Precambrian rocks. Most of these rocks are igneous of continental origin and some of them are oceanic origin. The most important metallic deposits of Iran occurred in the Precambrian rocks of Central Iran. The main parts of these deposits occurred in the metamorphosed rocks of Saghand–Chador Malou and Bafque regions. These deposits constitute the most largest and important economical deposits of Iran. The Chador Malou, Choghart, Golgohar, Sechahoun and Gelmandeh Iron Ore deposits, Kushk lead – sphalerite mines, Saghand and Narygan Uranium deposits and Esfordy phosphate, deposits are the some of these examples. Based on new investigation it is suggested that the separation of ore rich melt and the ensuing hydrothermal processes dominated by alkali metasomatism were both involved to different degrees in the formation of ore deposits in Central Iran. Because of high concentration of various and largest deposits in this limited area of Precambrian age we can call the Precambrian of Central Iran as metallogenic province and metallogenic epoch.*

**Key words:** *Precambrian rocks, central Iran, metallogenic, ore deposit*

### **Introduction**

One of the most important and interesting geological structure occurrences in Iran is the Orogenic movements, which is comparable with the occurrence of Katangan in Gondwana land and Baikalian in the Eurasian continent. Paleozoic vertical movements took place during the Cambrian and caused sudden change in lithology or short break in sedimentation (Eftekhari Nezhad 1975). From tectonic point of view Iran can be divided into two marginal active fold-belts located in the NE that is Kopeh Dagh and in the SW which called Zagros Zone resting on the Hercynian terrain and the Precambrian Arabian plate respectively. Between these marginal fold belts are the Central Iran, Alborz, Zabol-Baluch and Makran units (Stocklin and Nabavi 1973). The geologic structure of various tectonic zones is essentially the result of Alpine Orogeny of Tertiary age. The Precambrian rocks occupy more than half the Ardekan Quadrangle map in Central Iran and may reach 10000m in exposed thickness (Haghipour 1977). The Precambrian rocks of Iran can be divided into two main groups. The first one is the metamorphic complex which are called the basement rocks of Precambrian overlay disconformities by of Katangan, and the second one which are more as marginal continent, they deposited after the Katangan Orogeny, are called late-Precambrian rocks.

### **Geology of the Area:**

The basement complex is used here to set of rocks underlying the pan African unconformity and comprising mostly metamorphic or igneous rocks with the age of the bottom of the related rock cover being variable, ranging in most case from 570 to 550 ma. Central Iran in a broad sense, comprising the whole area between the North and South Iranian ranges . The rocks which are called Precambrian rocks in Iran are exposed in the zonal structure of Central Iran, Alborz, Lut and Zagross. The sequences of low to high grade metamorphic rocks of Precambrian age with the thickness of about 2000 meters exposed in Central Iran. According to Haghypour (1974) and Aghanabaty (2004) based on metamorphism process and Stratigraphy events, these rocks can be divided in to four groups as follow 1) Earlier Series , (2) Chapedony Complex,(3) Bonehshuro Complex and (4)Tashk Formation.

The Chapedony complex with about 4000 meters thickness and the highest grade of metamorphism is the oldest Precambrian rock in Saghand – Posht Badam region of Central Iran. The Precambrian Chapedony and Poshte Badam formation of east Central Iran consist of meta-greywacke, meta-diorite meta-andesite ,amphibolites, pyroxenites, serpentine and calc-alkaline intrusive island arc ,(Haghypour 1974,1977,Berberian and King 1981). The sequences of low to high grade metamorphic rocks of Precambrian with the thickness of about 2000 meters exposed in central Iran. The metamorphism in the central Iran is due to tectonic activities of the area In the Chapedony Complex granitization has more important role, because at least two phases of migmatization very well can be recognized..

The first phase has been cut by the second one (Darvishzadeh 1992). The megascopic structure of the gneisses in the field can be seen in microscopic thin section also as microstructure. The major part of Chapedony Complex is occupied by banded gneisses which consist of light band of quartz and feldspar and dark band made up of biotite along with amphibole

### **Metallogenic of the Area:**

The most important metallic deposits of Iran occurred in the Precambrian rocks of Central Iran. The main part of these deposits occurred in the metamorphosed rocks of Saghand–Chadormalou Regions. These deposits constitute the most important and economical deposits of Iran .The Chador Mmalou, Choghart , Golgohar, Sechahoun and Gelmandeh Iron Ore deposits. , Koshk lead – sphalerite mine, Saghand and Narygan Uranium deposits , Esfordi phosphate and Salt Diapers deposits are the some of these examples, The a banded mine of Narygan Manganese also can be added to these deposits . Therefore the mineralization of this epoch and province can be categorized in to (1) Iron ore, for example, Choghart was a prominent iron oxide deposit in the Bafq mining district of Iran. 800meters length and 300 meters width , standing 150m above the surrounding plain and 1257 m above sea level. (2) Lead –Sphalerite deposit (3) Uranium and (4) Salt Diapers deposits without considering the Narygan Manganese in which the last two. Each of these deposits is one of the largest and important deposits in Iran (.5) The Esfordi apatite-magnetite deposit is situated in the Bafq district of central Iran. is the most P rich deposits in that Iran and is hosted by a sequence of early Cambrian rhyolitic volcanic rocks and intercalated shallow-water sediments. Bafgh Mishidovan refractory is a potential of the refractory group minerals.

## Conclusion

The Precambrian basement complexes in the Saghand region along the Chapedony and Posht e Badam faults as the oldest rocks of the Iranian micro plate and considers that they were emplaced during Palaeo-to Mesoproterozoic time with consolidation concentrated between 2400 Ma and 2100Ma. The greenstone belts, paleo-suture zones and ophiolitic rocks around the high-grade metamorphic rocks of central Iran confirm that an island-arc type cratonization occurred here .The presence of Neo proterozoic volcanic here is also an indication of stretching of the Arabian–Iranian continental crust during an extensional phase of Pan–African orogeny. The host rocks of these deposits various from sedimentary to high grad metamorphic rocks (dolomite, meta greywacke slate, shale, quartezite, amphibolites and gneiss and also extrusive and intrusive ((rhyolite pyroxenite and, pegmatite) rocks .Most of them have been cut by late magmatic activities especially this is very common phenomena in the Bafgh iron ore deposit. The various mineralization in the Precambrian rocks of Central Iran indicate the potential resources of different geological activities and mineralization processes which have been occur in these areas. From the events of the above four categorized ore deposits, one can easy conclude that, the Precambrian age in Central Iran is one of the most metallogenic epochs and Province in Iran.

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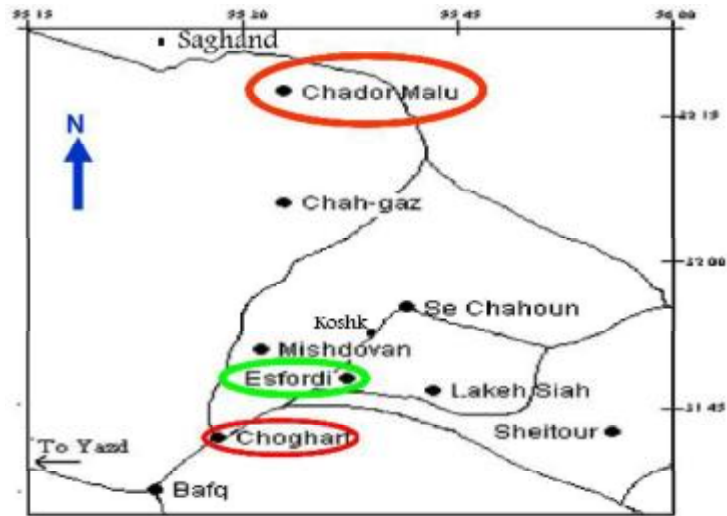


Figure1: Ore locations in Central Iran.

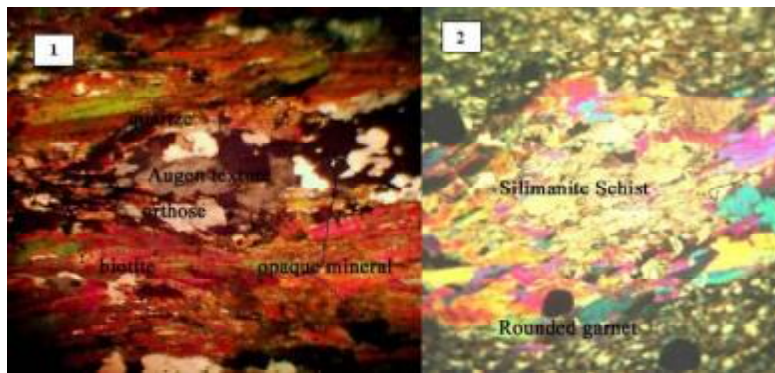


Figure2: Typical metamorphic texture in Metamorphic rocks of Central Iran.