METALLOGENIC MODEL OF KIMBERLITE IN NORTH CHINA CRATON, CHINA.

P. Zhang[(1)] *and S. Hu*[(2)].

(1) Ministry of Geology and Mineral Resources, Beijing, China; (2) 7th Geological Brigade, Linyi, Shandong, China.

1.Temporal and Spatial Distribution of Kimberlites in North China Craton.

There are many kimberlites in the North China craton (abbreviated to "NCC"). They are Mengyin, Fuxian, Tieling, Huanren-Tonghua, Hebi, Shexian, Liulin, Yingxian, Datong kimberlite fields.

The Mengyin kimberlite field consists of 11 pipes and 47 dikes. Most kimberlites wall rock is Archean gneiss, just very few kimberlites have c-o limestone wall rock. Most of pipes and all dikes have root-zone hypabyssal facies kimberlite, only a few pipes have a little diatreme-facies tuffisitic kimberlite breccia. All of them are diamondiferous kimberlites but only serveral pipes and one dike are economically diamondiferous. Radiometric dating of Mengyin kimberlite gave an age range of 450 to 500 Ma, but the best datum is 457 +/- 7 Ma. The field is located about 60 Kms of westside of Tanlu fault.

The Fuxian kimberlite field consists of 18 pipes and 58 dikes. The wall rock of kimberlites are Proterozoic sandstone and limestone. The basement age is older than 2500 Ma. Most of pipes and all dikes have root-zone hypabyssal facies kimberlite, but two pipes have diatreme-facies tuffisitic kimberlite breccia. The best one of isotopic age of Fuxian kimberlite is 462.7 +/- 4.8 Ma. Most of Fuxian kimberlite are diamondiferous kimberlite and only a few pipes are economically diamondiferous. The diamond quality of Fuxian kimberlite is the best one of all over the world. They contain 60 % of gem stone and most of gem stones are colourless and transparent.

The kimberlites of Tieling, Huanren-Tonghua, Hebi, Shexian, Liulin, Yingxian and Datong do not contain diamond or contain diamond very very poor and did not do any radiometric dating. All of these kimberlites are root-zone hypabyssal facies kimberlite. The basements of Tieling, Yingxian and Datong kimberlites have an age of Archean and the basements of Huanren-Tonghua, Hebi, Shexian and Liulin kimberlites have an age of Proterozoic. The Tieling kimberlite field is located near the Tanlu fault. The Hebi and Shexian kimberlite fields are located near the Taihangshan fault. The Datong, Yingxian and Liulin kimberlite fields are located near the Fenwei fault (see the sketch map).

2 Basical Features of North China Craton

2.1 Position and area of North China Craton

NCC is located in northen part area of China, including the whole area of Shanxi, Hebei, Shandong and Liaoning four provinces and Beijing, Tianjin two cities and part of Inner Monggoia, Ningxia Autonomous Region, Jilin, Henan, Anhui, Shaanxi and Jiangsu provinces,forming a northern wider and southern narrower reversed triangle in China. The area is about 1.46 million km^2.

2.2 Brief history of development of North China Craton.

2.2.1 Archaeozoic Era

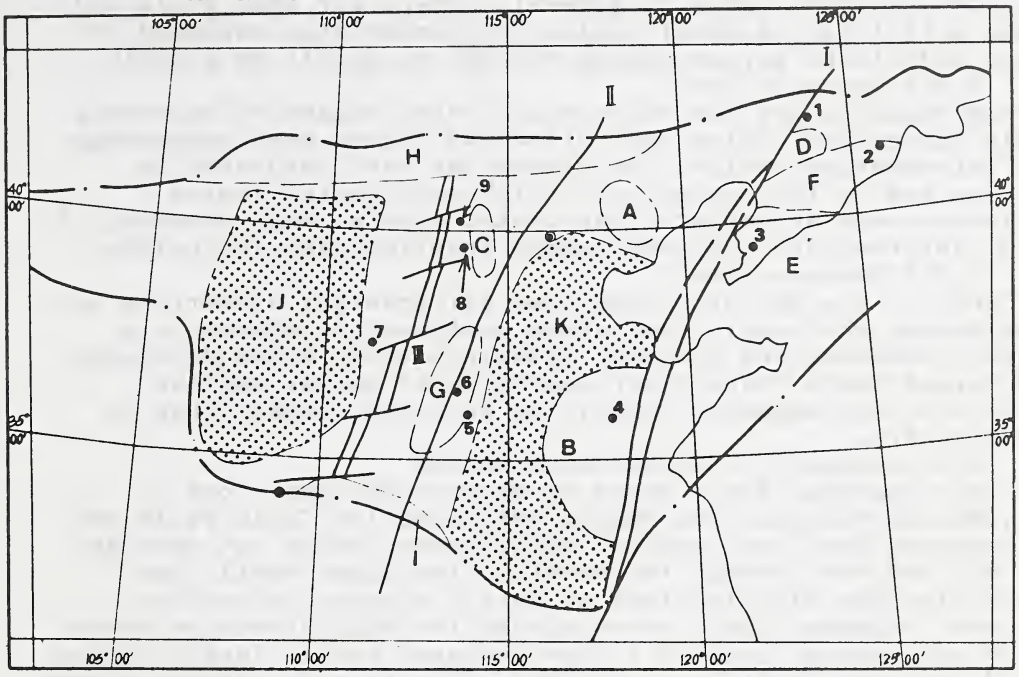
Archean was the period of geosyncline developing peirod, but the time of geosyncline development were different with different areas. Some older nuclear areas could have been outlined as follows:

A.Jidong area(Eastern Hebei) with Archean age of 3500-3700 Ma.

B.Luxi area(Weatern Shandong) with Archean age of 2500-3300 Ma.

C.From Wutaishan-Henshan(Northern Shanxi) to Jining(Inner

KIMBERLITES SKETCH MAP OF NORTH CHINA CRATON



1. Tieling kimterlite field. 2. Huanren-Tonghua kimberlite field.
3. Fuxian kimberlite field. 4. Mengyin kimberlite field.
5. Hebi kimberlite field. 6. Shexian kimberlite field.
7. Liulin Kimberlite field. 8. Yingxian kimberlite field.
9. Datong kimberlite field. I. Tanlu fault.
II. Taihangshan fault. III. Fenwei fault.
A. Jidong old nuclear. B. Luxi old nuclear.
C. Wutaishan old nuclear. D. Anshan old nuclear.
E. Liaonan old nuclear.
F. Hunjiang-Taizihe Proterozoic mobile zoon.
G. Taihangshan Proterozoic mobile zoon.
H. North margin of craton Proterozoic mobile zoon.
I. South margin of craton Proterozoic mobile zoon.
J. Rerduosi Mz-Kz basin. K. North China Mz-Kz basin.

Monggoia) area with Archean age of 2500-3200 Ma.

D.Anshanarea (Northern Liaoning) with Archean age of 3100 Ma.

E.Liaonanarea (southern Liaoning) with Archean age of 2500-3000 Ma. The other aeras of NCC evoluted to geosyncline developing stage in different period of time in Archean. By the end of Archean the areas stated above folded back and formed the NCC Archean crystalline basement.

2.2.2 Proterozoic Era

The areas where sediments occurred in Archean were relatively stable. Some of them subsided and accepted the sediment in Proterozoic Era and others were stable at above the sea level, where the Proterozoic sediments were missing.During the time some mobile belts developed, e.g. Hunjiang-Taizihe and Taihangshan Proterozoic mobile belts and the Proterozoic mobile belt at south margin and north margin of NCC. All these mobile

belts show that in Proterozoic Era many faults activities occurred forming many fault depressions where very thick fiysch sediments, a large quantity of volcanic rocks and a series of magma intrusions occurred. By the end of Proterozoic Era whole NCC consolidated and formed unitary basement of NCC.

2.2.3 Palaeozoic Era

In Palaeozoic Era whole NCC was very stable, a tipical craton developing stage. There was a sedimentary gap between Middle Ordovician and middle Carboniferous period, which was parallel unconformity not angular unconformity, suggesting in Palaeozoic Era NCC was very stable in general, except for some fault and magma activities in small scale. The kimberlites emplaced in Upper Ordovician period during the NCC to uplift as a whole.

2.2.4 Mesozoic Era

During Mesozoic Era the NCC was activated suggested by strong fault acticities, which controlled and formed many upwarpings and intermontane basins, the upwarpings were subjected to erosion and in the basins very thick continental facies sediments were accumulated associated with a large quantity of acid, intermediate and basic magma eruptions and intrusions.

2.2.5 Cenozoic Era

In Cenozoic Era NCC still had some differential elevations and subsidences obviously. Some areas continued to elevate,e.g. Western Shandong and Southern Liaoning, other areas depressed and formed North China Plain and Eerduosi Basin, but the structural and magmatic activities were much weeker than in Mesozoic Era.

2.3 Lineament in North China Craton

The main regional fault zones in NCC are NNE and close to EW (NEE) directions. The famous NNE direction Tanlu Fault and Taihangshan Fault are reginal fault zones, which cut through the NCC and cut through the crust to the upper mantle and controlled the distributions of mantle sourece intrusions. The next biggerst fault zones are EW (or NEE) direction zones, which are several hundred to one thousand kms in length. These two directions fault zones cut the NCC into many rhombic blocks.

3 Regional Metallogenic Model of Kimberlite in North China Craton

3.1 All diamondiferous kimberlites and economic kimberlites emplaced in Archean basement areas, e.g. Fuxian and Mengyin kimberlite fields. The kimberlites emplaced at the margin of the craton have no diamonds or very poor,e.g. Tieling kimberlite field. All the kimberlites emplaced in Proterozoic mobile belts have no diamond, e.g. Hebi, Shexian and Hunjiang-Taizihe kimberlite fields.

3.2 The kimberlites dominantly emplaced in both sides of huge regional fault zones, e.g. Tieling, Fuxian and Mengyin kimberlite fields emplaced on both sides of Tanlu fault, Shexian and Hebi kimberlite fields emplaced on one side of Taihangshan fault, Daton, Yingxian and Liulin kimberlite fields emplaced on both sides of Fenwei fault.

3.3 The shapes of pipes and trending directions of dikes are controlled by surface faults.

3.4 The pipes emplaced in Archean and Protorezoic system have been eroded to root zone at presęnt. It is impossible to find kimberlites which occurred in upper Palaeozoic Era or Mesozic Era because the kimberlites emplaced in upper Ordovician Period. Therefore, to search for preserved crater or diatreme facies kimberlite must work in lower palaeozoic formation (especially in Ordovician) areas.

Accordance with the model stated above, it can be forecasted:
1.kimberlitic type primary sources of diamonds shall be looked for dominately in NCC, and should work in the areas which surround the older nuclear or itself, where the NNE or EW directions regional fault zones occurred and lower Palaeozoic formations preserved, and
2.in NCC lamproites might have emplaced, which should be looked for in the Proterozoic mobile belts stated above especially in the Proterozoic mobile belts in both south and north margin of NCC. Because the former was subducted by Qinling block from south and the later was subducted by Siberian block from north in Proterozoic Era. The block subducting activities might have been advantageous to the emplacement of lamproite.