Lamproites in the Yangtze Craton, China

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There are five lamproite Fields occurred in the Yangtze Craton, where is one of the best craton for exploration of the lamproite type diamond in three main cratons (Sino-Korean, Talimu and Yangtze Craton, Fig.) in China.

Four diamond placer mines had been found by early diamond exploration in Yangtze Craton and five lamproite fields were discontinuously discovered up to now. They are: 1. Maping field consists of three separate groups - Maping, Majiang and Leishan lamproite groups, and distributed between Proterozoic and Paleozoic fold belts; 2. Dahongshan lamproite group in the north margin of the craton; 3. Ningxiang lamproite group occurred in south Proterozoic fold zone; 4. Dayaoyuan lamproite group intruded in south-east margin of the craton and 5. Chuanxi lamproites located in west margin of the craton. Besides, there are other K-rich rock suites distributed around the margin of the Yangtze Craton.

The ages of the lamproites are remarkably diverse, ranging from 540-530 Ma for Chuanxi lamproites to 166(?) Ma for the Dayaoyuan lamproite group, but a large number of lamproites formed in Proterozoic period (490-328 Ma). While most of K-rich rocks intruded at Mesozoic-Cenozoic Era. The diversity of ages and structural setting might be related to the structural evolution of the Yangtze Craton which may be a transformed process from Archon to Proton of Tecton. The distribution of lamproite fields was controlled by Proterozoic subduction and associated with major fractures.

Occurrences of lamproite groups in Yangtze Craton is various. The Maping groups consist of dikes, diatremes and sills, which intruded through Cambrian limestones; Dahongshan lamproite belt compromises 10 volcanic groups formed by sea-bottom volcanic eruption and 40 hypabyssal intrusives. The extrusive of intrusive forms have been divided into volcanoclastic (including agglomerate, breccia, lappili, tiff) and magma massive rocks (including intrusion of central facies, daces, sills and lava flow); Ningxiang lamproite groups consist of 7 diatremes and 17 dikes intruded into Proterozoic formation; Dayaoyuan lamproite group in recently discovered, over 10 dikes occurred in Devonian and Carboniferous formation and association with lamprophyres; Chuanxi lamproites occurred as pyroclastic rock between Sinian silieous limestone and Cambrian carbonaceous shales.

The petrogical types are divided into Ol lamproite (Ph-Ol lamproite), Ol-Di lamproite, Ph-Di-San lamproite and Ph-San-Lc lamproite according to the volumetric of the primary and major minerals and their own litological facies in rock body.

Mineral component in the various lamproites is overlaped: olivine lies in the range of Mg/(Mg+Fe)=0,77 0,93 (phenocryst Fo=77 88, phenocryst Fo=90 93), phlogopite has two distinct groups: one is rich in Al , poor in Ti like in kimberlite, another is rich in Ti and Al similar to lamproites of Kapamba, Mejhgawan and Smoke Buttle. The composition

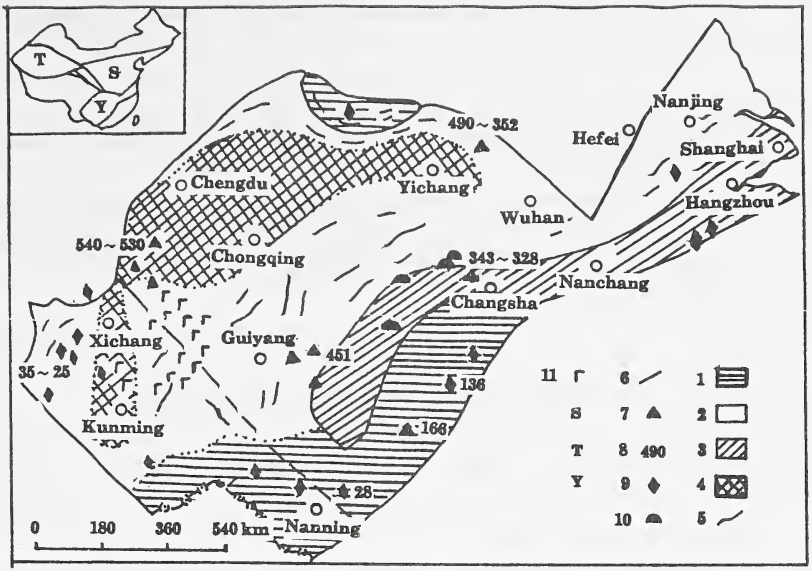

Fig 1 The draft map of the Yangtze Craton showing the locations of ①Maping, ② Dahongshan,③ Ningxiang, ④ Dayaoyuan and ⑤ Chuanxi lamproite groups, and other K-rich rock suites.

S Sino-Korean Craton; T Talimu Craton; Y Yangtze Craton
1. Palaeozoic fold belts; 2. Proterozoic-Palaeozoic basins;
3. Proterozoic fold belts; 4. Archaean basement;
5. fold areas; 6. faults; 7. lamproite groups;
8. age(Ma); 9. K-rich rocks ;
10. diamond placer; 11. Emeishan basalt area(Permain period)

of diopside in many intrusives is of variation which two trends: one is Ti increasing with Al increasing and the other of preserving low Ti with Al increasing. K-richterite is lower in K, Mg and higher in Na and Al than that of the K-richterite of West Kimberly lamproites. The heavy mineral suite dominated by chrome spinel, chrome diopside, pyrope, ilmenite, apatite, provskite, jeppeite and some melt facies volcanic microsphelures. Diamonds mainly occur in the Ol lamproite or Ph-Ol lamproite and is rare or barron in other rocks. Mantle xenolith is very rare. Chrome diopside xenolith and lherzolite (Sp or Gt) can be found sometimes.

Chemical composition of lamproite in the Yangtze Craton are: SiO_2 ranges from 34,5% to 55%, MgO 5%~20%, K_2O/Na_2O=2~-5, $K_2O/Al_2O_3 \approx 1$, Mg/(Mg+Fe)=0,74~0,80. Rare earth elements are characterixed by high LREE at (500-~1300) × chondriteic abundance with very low abundance of HREE (≈5 ×chondritic). Compared with other lamproite suites, the Yangtze lamproites are much richer in Ca, Al,

Na and poor in K, Mg. This character might be related to both less stronger depletion and enrichment of lherzolite source.

Table 1 and Table 2 demonstrate Sr, Nd and Pb isotopic compositions of main lamproite groups in the Yangtze Craton . The data show that Sr and Nd isotopic composition are in between group I kimberlite and group II kimberlite, and may be appear a tendency for two direction evolution towards Lucite Hills, Smoke Buttle lamproite and West Kimberly lamproite. Pb isotope composition indicated that These lamproites had a multistage history. The depletion of U, Th took place at 2,0~2,2 Ca ago and enrichment event of Sr, Nd, and REE was later at about 1,6~1,8 Ca ago. Since then, Sm-Nd system in the rocks perhaps has been reequilibrated.

Table 1 Sr and Nd isotopic composition in lamproites

$^{87}Sr/^{86}Sr$	$^{143}Nd/^{144}Nd$	ε Nd	N
Dahongshan lamproites			
0.7063~0.7081	0.51164~0.51195	−1.2~−10.7	8
Ningxiang lamproites			
0.7062~0.7067	0.51197~0.51198	−8.38~−8.54	5
Maping lamproite			
0.7054~0.7080	0.51161~0.51184	−8.5~−9.0	3

Table 2 Pb isotopic composition in lamproite

$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$	N
Dahongshan lamproites			
17.34~19.94	15.36~15.74	37.13~40.95	8
Ningxiang lamproites			
17.88~19.48	15.49~15.59	38.16~39.89	5
Maping lamproite			
17.19~17.71	15.30~15.53	38.19~38.88	3