

## Several Questions in Searching for Diamondiferous Kimberlite in China

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### Introduction

Scientists widely recognize the magma that forms diamondiferous kimberlite and lamproite (DKL) is from the mantle with a depth of 150-250 km and even from the lower mantle. Most diamond deposits are in kimberlites, which is of great significance for studying the dynamics of mantle magma origins, C-P-T-PH<sub>2</sub>O conditions and structure in the deep. DKL's economic and scientific research value inspires us to constantly search for it for 70 years in China, with no significant discoveries in the 50 years following the ones of Mengyin in 1965 and Fuxian in 1974 (Ding et al. 2020; Song et al. 2019).

Deeply understanding critical points of searching for DKL are in an older Craton with inside Deep Faults cut through, having KIM clues and small volcanic topography (Ding, 2020a). However, not much progress in discovering has led to a lack of conditions for Chinese geologists to study the deep geology of the mantle through such "ultra-deep drilling cores," resulting in a lack of "foundation" in other studies on the North China Craton and no much contribution to the world's research in the sector.

### Studies and Investigation

However, some scholars have studied the crustal structure, evolution, and rock replacement of the North China Craton through the presence of large crystals and deep-seated inclusions in some basaltic eruptions or kimberlite from areas such as Zhangbei in Hebei Province, Hebi in Henan Province, and Changle in Shandong Province (Wu et al. 2019; Zheng et al. 2018; Zheng et al. 2021). Zhang et al.(2007) used the Ar-Ar method to determine the age of both the Mengyin and Fuxian Kimberlitic mines as O<sub>2</sub> and Sr-Nd-Hf isotopes were adopted to study the depth and process of the magma origin. Li (2019) and Li et al. (2018, 2024) studied in-

depth research on plate subduction, alkaline magma, and the deep carbon cycle. However, kimberlite indicator minerals, including diamonds, have been found in many parts of China, suggesting that DKL may exist. There are North China Craton and South China Craton in China (Figure). Ying County in Shanxi, Cixian County and Shexian County in Hebei, Hebi City in Henan, Dahongshan in Hubei, Shimen County and Huaihua County in Hunan, Zhenyuan County and Shibing County in Guizhou Province form a DKL anomaly west zone in China; The cities of Wafangdian and Pulandian in Liaoning, Fei County, Mengyin County and Tancheng County in Shandong, Langan County in Anhui, Xinyi and Suqian City in Jiangsu become the DKL anomaly east zone. These two DKL anomaly zones are parallel and have an angle of 23 with the Earth's axis (Figure). It is interesting to see that the zone direction is also parallel to the convergent boundary of the subduction of the west Pacific slab. Although the distance between the east zone and the Ryukyu volcanic island arc is 1,315 km (Figure) and 2,130 km away from the subduction zone of the Western Pacific Plate composed of the Japan Trench and the Mariana Trench, we cannot exclude the slab movements may induce upwells of the magma from deep in the mantle.

In the west zone, southern area of the Qinling Mountains receives Quaternary sediments over 120 meters in thickness which covered possible DKL craters, limestone caves interfering analysis satellite data (Ding, 2020b), and is in the relatively young South China Craton. We do not exclude the existence of diamondiferous lamproite in the area (Ding et al. 2020).

At present, our hope for discovering DKL focuses on the east zone: first, it is within the North China Craton, an older one with an age of 2.5-4 billion years; second, the zone is in or near the Tancheng-Lujiang deep fault belt; The third is large diamonds continuously unearthed in the Tancheng County (338.60 ct. "Linyi Star", 281.25 ct. "Jinji", 158.79 ct. "Changlin" Diamond, and 124.27 ct., 96.94 ct., and 92.86 ct. from alluvial mines in the Tancheng County, and 52.71 ct. of diamond in Suqian City, Jiangsu Province).

Glaciers are a transportation medium, creating tills, products of glacier erosion, entrainment, transportation, and sedimentation processes. Other transportation media include rivers, streams, lakes, etc. (Ding et al. 2019). However, the Quaternary in eastern China has a large coverage area with over several to hundreds meters of settlements in thickness, and with no streams, which resulted in tracking the hidden DKL using traditional methods such as river or glacier media is impossible. Although Hunan and Hubei province have developed water systems, the Quaternary thickness exceeds 120 meters. The streams in Pingquan County, Hebei Province, are most suitable for tracking KIM but lack stronger related clues.

Tancheng County (Figure) lacks streams for KIM tracing, but its comprehensive indications to DKL are the strongest, which fields are flat with only a small amount of outcrops of limestone, volcanic rock, and quartz sandstone. Designing an extraordinary approach of tracing DKL for this region has been a question we have been pondering over the years.

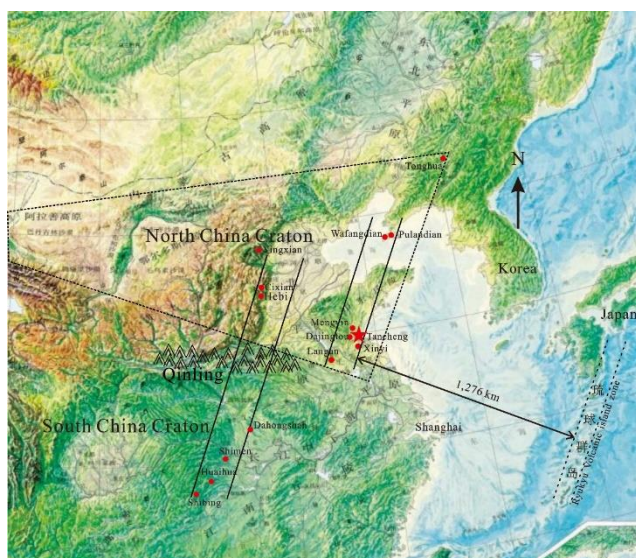
## **Conclusions**

For the area with no streams or other transportation media and thick coverage of Quaternary settlements, designing an extraordinary approach to tracing DKL has been a question we have pondered over the years.

The subduction and continuing movement of the Pacific west slab may induce upwells of diamondiferous magma deep in the mantle.

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**Fig. 1** the topographic map. The two zones (black lines) parallel each other and contain DKL-suspected locations with red dots. They, with an angle of 23 between them and the Earth's axis, are also parallel with the Ryukyu volcanic island zone, 1,276 km away. The prospect area is Tancheng County ("red star"). The triangle with short black lines is the North China Craton.