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Geochemistry Study of Cenozoic Wangtian'e Volcano in Northeast China

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Wangtian'e Volcano (41˚43.6′N, 127˚54.3′E), which is ca. 35 km south of the famous central-type Tianchi Volcano, locates on north part of Changbai County, on the border of Changbai County and Fusong County, Jilin Province, Northeast China. It is another large central eruption volcano on the south slape of Changbaishan. The highest peak of Wangtian'e Volcano locating on the southeast rim of the caldera is 2438 m high, which is the second highest peak in Northeast China. The main part surrounding Wangtian'e Volcano is a large area of basaltic lava as a shield platform. The lava flow reaches the bank of the Yalu River in the south and stretches across the Yalu River over to the North Korean side to the east, advances into Fusong County in the north, reaching the east of Linjiang to the west, which covers an area of nearly 4000 km^2. Development of radial drainage formed gullies around Wangtian'e cone. In the part of Changbai County, the gullies are named No. 8 to No. 23 gully. Due to the late drainage, from No. 13 to No. 19 gullies, trachybasalt with well-developed columnar jointing occurs, leading to the formation of isolated tower forest spreading along both sides of the drainage. On top of the Wangtian'e cone there exists alkalic rhyolite. Volcanic rocks were collected from the bottom to the top of Wangtian'e Volcano in 2006. Basaltic rocks consist of plagioclase rich phenocrysts, alkalic rhyolite has the presence of sanidine phenocrysts.

The dominant Cenozoic (7.04-1.86Ma) volcanic samples from Wangtian'e Volcano are basaltic trachyandesite and alkalic rhyolite. The basaltic trachyandesites have low SiO_2 (49.38%-53.31%), K_2O+Na_2O (4.27%-7.72%) and $\sum$REE (163.69ppm-258.55ppm). δEu range between 0.72 and 1.17. The alkalic rhyolites have high SiO_2(70.39%-71.49%), K_2O+Na_2O (9.28%-9.49%) and $\sum$REE (309.30ppm-465.03ppm). The value of δEu is 0.72 to 1.17. $^{87}Sr/^{86}Sr$ and $^{144}Nd/^{143}Nd$ vary within 0.705156-0.709029 and 0.512602-0.512295 respectively. Radiogenic Pb is relatively low ($^{206}Pb/^{204}Pb$=17.254-18.090; $^{207}Pb/^{204}Pb$=15.460-15.507; $^{208}Pb/^{204}Pb$=37.278-38.048). All the above characters show that there are two magma sources that generate basaltic trachyandesite and alkalic rhyolite.