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Relationship between the latest activity of mare volcanism and topographic features of the Moon

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Lunar mare basalts provide insights into compositions and thermal history of lunar mantle. According to crater counting analysis with remote sensing data, the model ages of mare basalt units indicate a second peak of magma activity at the end of mare volcanism (∼2 Ga), and the latest eruptions were limited in the Procellarum KREEP Terrane (PKT), which has high abundances of heat-producing elements. In order to understand the mechanism for causing the second peak and its magma source, we examined the correlation between the titanium contents and eruption ages of mare basalt units using compositional and chronological data updated by SELENE/Kaguya. Although no systematic relationship is observed globally, a rapid increase in mean titanium (Ti) content occurred at 2.3 Ga in the PKT, suggesting that the magma source of mare basalts changed at that time. The high-Ti basaltic eruption, which occurred at the late stage of mare volcanism, can be correlated with the second peak of volcanic activity at ∼2 Ga. The latest volcanic activity can be explained by a high-Ti hot plume originated from the core-mantle boundary. If the hot plume was occurred, the topographic features formed by the hot plume may be remained. We calculated the difference between topography and selenoid and found the circular feature like a plateau in the center of the PKT, which scale is ∼1000 km horizontal and ∼500 m vertical. We investigated the timing of ridge formation in the PKT by using stratigraphic relationship between mare basalts and ridges. The ridges were formed before and after the high-Ti basaltic eruptions and seem to be along with the plateau. These results suggest that the plateau formation is connected with the high-Ti basaltic eruptions.