COMPARTIVE GEOCHEMICAL ANALYSIS OF KING'S BOWL, IDAHO AND ULLEUNG ISLAND VOLCANIC ROCKS, KOREA . K. J. Kim[1,2], C. Sun[1,2], J. Heldmann[3], D. Lim[3] , E. Yi[1,4], Y. Choi[1,2], Y. S. Lee[5]. [1]Korea Institute of Geoscience and Mineral Resources, [2]University of Science and Technology, [3]NASA Ames Research Center, [4]Chungnam National University, [5]Pohang University of Science and Technology. (kjkim@kigam.re.kr)

Abstract: We have been investigating the geochemical characteristics of volcanic rocks of selected regions located in Idaho, USA and compared them to the geochemistry of those found on the Korean Peninsula. In particular, we compare volcanic rocks from the Craters of the Moon (COM) and the King's Bowl (KB) volcanic fields to those of Mt. Baekdu and Ulueng Island in order to gather an understanding about the source of magma that is revealed at the current surface of those volcanic fields. Two distinctive chractesristics observed: (1) King's Bowl samples and Ulleung Island volcanic core samples are geochemically comparable, which we may be able to attribute to their similar proximity to their magma chambers. (2) The Craters of the Moon and Mt. Baekdu samples reveals geochemical characteristics as differenciated volcanic rocks. Further investigation on terrestrial volcanic rocks would give new insight in understanding lunar volcanic activities and geochemical characteristics with respect to the source of magma.

Sample Description: Total 59 Samples from both Uleung Island (54) and King's Bowl (5) were analized at the KIGAM's analytical center for XRF analysis. In the case of data for Craters of the Moon and King's Bowl, we used the reference values of Leeman et al. 1976 and Kuntz et al. 1985, respectively. For the lunar data, references of Chappell et al, 1972, Dowty et al. 1973, Papike, 1976 are used. The data for Korean Peninsula were obtained for mostly Bakdu Mt. from references of Jang, 2001, Sim, 2003, Yun et al, 1993[1-9].

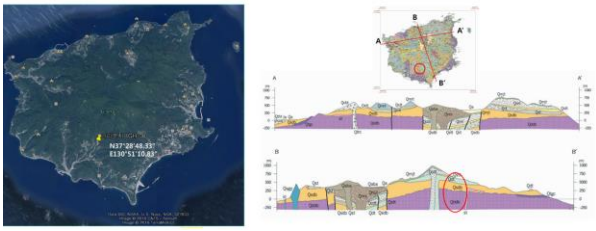

Figure 1. Loccation of the Ulleung Island and geology

Figure 2. Volcanic rock core obrained from the Ulleung Island. The deepest depth of the core is known to be 1 km.

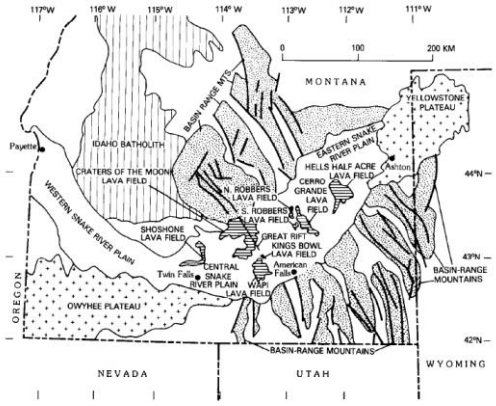

Figure 2. Map of the Idaho volcanic fields [9].

Figure 3. Photo of King's Bowl Phreatic Explosion Crater

Figure 4. Photo of the volcanic field of COM.

Figure 5. Photo of the volcanic field of COM.

Results and Discussions: Our preliminary investigation confirmed that the geochemical characteristics of volcanic rocks from KB (King's Bowl) are relatively similar to those of returned lunar samples with respect to both low K_2O+Na_2O and low SiO_2 contents exhibiting the geochemical characteristics of a mantle origin. We report that the similar characteristic of the mantle geochemistry is also clearly observed in both regions of Ulleung Island and Mt. Baekdu. In the case of TiO_2

and Al_2O_3 abundance, volcanic rock samples of this study have similar trends of Al_2O_3 and TiO_2 as between 10 to 20 wt(%) and less than 4% (wt), respectively. The Al_2O_3 (%) values have a linear trend with Fe_2O_3+MgO(%). The lower Al_2O_3 (%) values below 15% are related to the samples from Paekunbong pumic an alkali rhyolite samples from the Mt. Baekdu.

Based on seismic tomography and geophysical explorations, the current magma chambers of Ulleung Island and Mt. Baekdu are known to be located in a depth of about 30 and 5~10 km, respectively, with initial eruption dates at approximately 1.4 and 28 Ma, respectively. Volcanic core samples taken at a depth of 1 km at Ulleung Island and mantle source rock of Mt. Baekdu reveal geochemical characteristics of lunar basalts confirming even more that both magma source of and evolutionary processes on the Earth's moon closely compare to terrestrial volcanic processes associated with mantle sources.

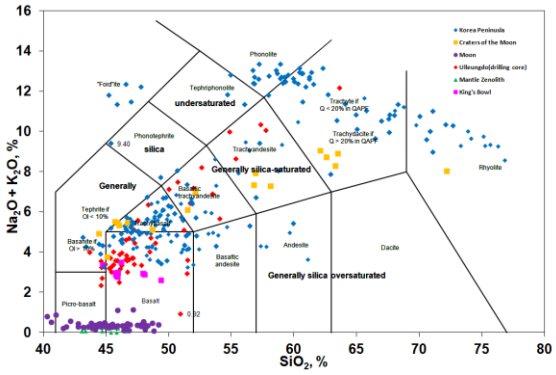

Figure 6. Chemical classificarion of volcanic rocks from Ulleung Island and King's Bowl with other references.

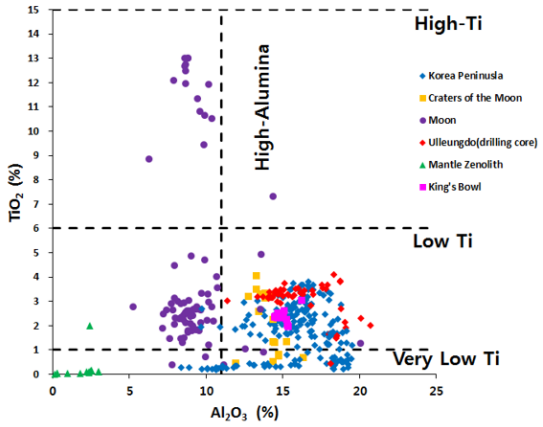

Figure 7. TiO_2 (%) data as a function of Al_2O_3 (%)

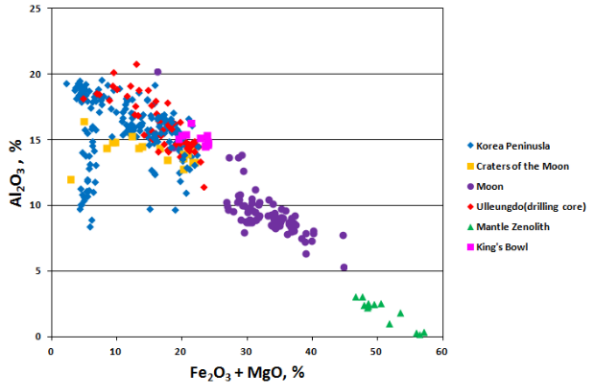

Figure 8. Al_2O_3 (%) data as a function of Fe_2O_3 + MgO (%). The lower Al_2O_3 (%) values in the left region are related to the samples from Paekunbong pumic and Baekdu Mt alkali rhyolite.

The mantle rock of Mt. Baekdu belongs to a picrite basalt showing close similarities to lunar basalts. We also found that geochemical evolutionary features of the COM (Craters of the Moon) and Mt. Baekdu volcanic rocks show quite similar, while those of Ulleung Island volcanic rocks reveal more alkaline characteristics. This presentation introduces aspects of the relationship between mantle sources and evolutionary features between lunar and terrestrial rocks from selected locations in the Earth. Further detailed investigation is planned in the near future.

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