Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SGC51-P05 Room:Convention Hall Time:May 24 18:15-19:30

Possibility of K-Ar age mapping on the moon using cosmogenic ^{39}Ar

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Rapid and wide range of age survey on the moon surface requires in situ measurement. ^{39}Ar of cosmogenic origin from ^{39}K in meteorite has been noticed since the early stage of noble gas research, and became a cue to the ^{40}Ar/^{39}Ar method. If the production rate of ^{39}Ar is considered uniform, the production and decay of ^{39}Ar reaches to equilibrium after a long time, since ^{39}Ar has a half life of 293 years. This half life is long enough to detect ^{39}Ar in meteorites and moon rocks, and short enough to reach equilibrium of the isotope. Thus, such rocks or minerals possess a certain amount of ^{39}Ar proportional to their potassium content. Using meteorites or rocks on moon surface under the same exposure condition, ^{40}Ar/^{39}Ar age can be determined. For a start, a precise date of one of those samples in a laboratory and ^{40}Ar/^{39}Ar ratio measurement of the same sample in the field are required to obtain J-value in the field. ^{40}Ar/^{39}Ar ratios measurement of the rest of unknowns in the field allow us to calculate ages. Interfering isotopes from calcium will not affect much as long as Ca/K ratio is low. Samples in a depth or a shadow from exposure are not suitable for the measurement since the neutron density attenuates with depth. However, no need for atmospheric contamination, mass measurement and ^{36}Ar measurement may provide us more mobility and rapid measurement.

Keywords: ^{39}Ar, Cosmogenic, age distribution, ^{40}Ar/^{39}Ar age, moon surface