SYSTEMATICS OF ALKALI AND PB ABUNDANCES IN METEORITIC AND LUNAR SAMPLES. Noriko T. Kita, Geological Survey of Japan, 1-1-3 Higashi, Tsukuba, Ibaraki 305 Japan.

The alkali depletion is not a unique characteristic of the moon, but is common to eucrites, angrites, and the earth. Because the moon and the earth are depleted in more volatile Pb in a similar degree to both chondrites and achondrites, it is hard to assume that alkali depletion was caused by vaporization loss during the giant impact event. Alkali and volatile depletion might have originated from their source material which accreted to the planets.

Humayun and Clayton [1] found the homogeneous K isotopic compositions in all the meteoritic, terrestrial and lunar samples. It indicated that volatile depletion in the solar system occurred in the solar nebula before the accretion of the planetary bodies. In the present study, Na, K, Rb and Sr concentrations and the $^{238}U/^{204}Pb$ ratios (μ-values) of all kinds of meteorites were summarized from the published papers, in order to compare the alkali and volatile depletion factors among meteorites and the moon.

The Na-Sr and Rb-Sr concentrations of achondrites are shown in Figs. 1 and 2 with the shadowed area indicating chondritic compositional range. Except for HED and angrites, all other achondritic meteorites (IAB, IIE, acaplucoite, winonite, aubrite, lodranite, ureilite) show Na/Sr ratios similar to chondritic values, though their Na and Sr concentrations vary over two orders of magnitudes and their Rb/Sr ratios show wider variations. It is likely that the coherent behavior of Na and Sr are controlled by plagioclase fractionation, and their original alkali/refractory abundance ratios were similar to the chondritic value. On the other hand, eucrites and angrites show Na depletion relatively to Sr in the range similar to lunar samples (Fig. 3). For this reason, the alkali depletion seems to be the common characteristics of the evolved planetary bodies.

In Fig. 5, measured $^{238}U/^{204}Pb$ ratios of bulk meteorites and lunar samples are summarized. In some cases, their source μ-values calculated from U-Pb isotopic analyses are shown. With the exceptions of carbonaceous and enstatite chondrites, all the meteorites show higher μ-values of between 1 and 100. Because the lunar mantle values estimated from lunar samples and lunar meteorites are about 10-30 [e.g., 2-4], there is no evidence that the moon is more depleted in Pb than chondritic materials.

The condensation temperature of Pb (600°C) is much lower than those of alkali elements (about 1000°C), so that any thermal process for the alkali depletion may cause the significant Pb depletion. However, this is not the case for eucrites, angrites, and the moon (and the earth ?). It is very likely that their parent bodies were formed from the source material of non-chondritic compositions in terms of alkali abundance, while their volatile elements (Pb) depletion was in the range of normal chondritic parent bodies.

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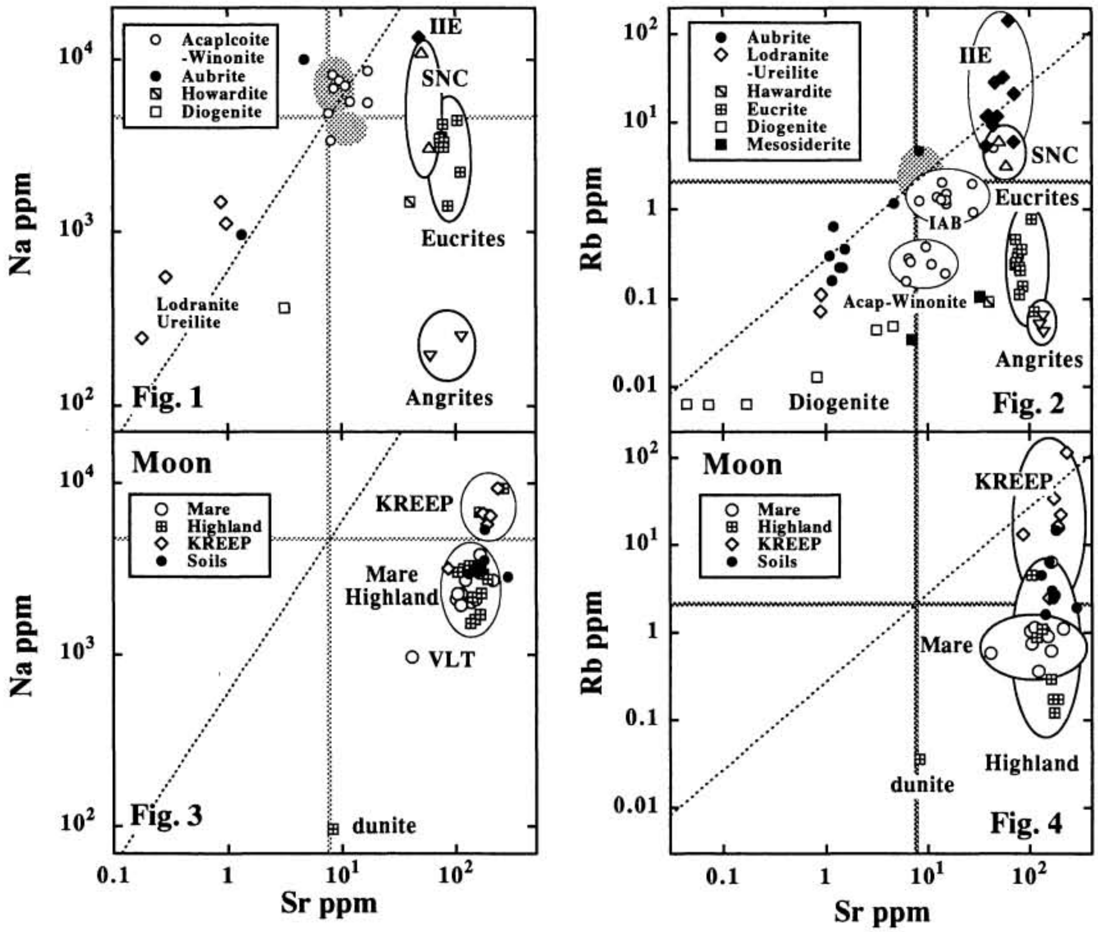

Filled symboles; Source-μ, Open Symboles; Sample-μ