Strontium, lithium and lead isotope ratios in atmospheric deposits in Fukuoka, Southwest Japan in the 1960s

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Recent atmospheric environment in the East Asia region is obviously worse than that in a few decades ago. The industrialization and economic development of the East Asian Nations since the 1970s increased air pollutants. Meanwhile, the expansion of arid zone and degradation of soils in the Asian Continent, especially in the mid-latitudes, cause dust storms to occur more frequently. Nowadays, anthropogenic pollutants have been transported a long distance with dust particles by the Asian dust storm events. Contrary to the other East Asian Nations, Japan experienced the worst air pollution in the 1950s and 1960s, since large amounts of pollutants had been emitted into the air with growing industrialization and with relatively loose regulations in those days. Thus, sources of air pollutants and factors controlling the atmospheric environments in Japan in the mid 20th century may differ from those in recent years. In this study, we discuss factors controlling the atmospheric environments in Japan about 50 years ago, the time of a high economic growth, based on the chemical and isotopic compositions of the atmospheric deposits.

The monthly atmospheric deposits in Fukuoka, northern shore of the Kyushu island located on the southwestern part of the Japanese Islands, in 1964 and 1965 were subjected to this study. The chemical compositions and Sr, Li and Pb isotope compositions in the deposit samples were determined.

The analytical results revealed that both the Li isotope ratio ($^{7}Li/^{6}Li$) and Pb isotope ratios ($^{207}Pb/^{206}Pb$, $^{208}Pb/^{206}Pb$) in the atmospheric deposit samples varied seasonally and temporally, through the 24 months. The Li isotope ratio shows good correlations with the concentrations of Li, Ca and Sr. Unlike those isotope ratios, Sr isotope ratio ($^{87}Sr/^{86}Sr$) showed no significant variation within analytical uncertainty. The seasonal variation in the Li isotope ratio may be attributed to mixing of sea salt, coal fly ash and mineral dust. The Pb isotope ratios are probably affected by exhaust gases from automobile using leaded gasoline, and their variation may be attributed to that of coal-derived soot.