Characteristics of marine aerosol particles in the southern sea of Korean Peninsula

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Aerosol particles were collected using high volume aerosol sampler on board in the southern sea of Korean Peninsula between Korean Strait and Jeju-do island during the periods of November 1997, April, September and November 1998 and February and May 1999 to understand the characteristics of marine aerosol particles. There was yellow dust storm in April 1998. Metals, cations, anions, Be-7 and Pb-210 were determined from filters (Whatman 41). The sources of metals in aerosol particles were classified from the enrichment factors normalized by abundances of crust and seawater. Na, Mg, K and Ca were mostly stemmed from seawater, however, the source of Ca was Chinese loess during the event of yellow dust. Al, Ti, Cr, Mn, Co, Zr and rare earth elements were originated from lithogenic materials. Ni, Cu, Zn, As, Mo, Cd and Pb with high crustal enrichment factors were flowed into the study area from artificial sources.

The concentrations of Al and other metals in aerosol particles during the event of yellow dust were remarkably higher compared with those in the different sampling periods. Depositional flux of metals during the yellow dust event of 10 days only was equivalent to 39% of annual depositional flux. The crustal enrichment factors of metals with artificial origins were higher by two orders of magnitude during the periods without yellow dust event compared with those in dust storm periods.

The values of S/Ca and Al/Pb-210 showed that marine aerosol particles during the periods without yellow dust event had longer residence time than those in dust event. Relationships between the concentrations of non sea salt sulfate, nitrate, trace metals, Pb-210 and Be-7 inferred that the aerosol particles generated from land were precipitated in study area even not far from land passing through high altitude. Annual depositional flux of metals was contributed from the wet deposition of 41%, dry deposition of 20% and yellow dust of 39% in study area. This indicates that annual depositional flux of metals through atmosphere in study area is strongly influenced by yellow dust events.